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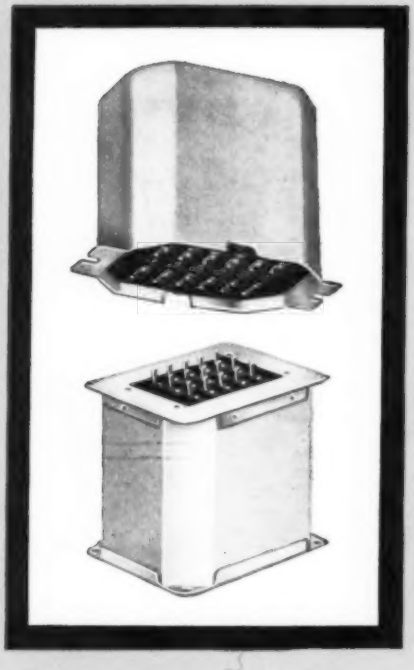

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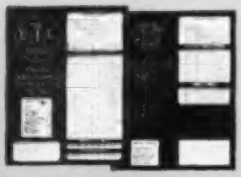

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73

Magazine

Wayne Grn, W2NSD

Editor, etcetera

March, 1963

Vol. XIV, No. 3

Cover:

Leonard Tamulonis, W1MEL

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Low power rig and small receiver. Eminently portable.

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Readers should stop reading the fine print and stick to the articles and editorial.

de W2NSD

never say die

FCC Flash

It seems probable that the FCC will soon release another 25 kc segment of the 160 meter band. Details next month.

Fly By Night Organization

We're really getting things set for the big European trip this fall. This is going to be a trip that will never be forgotten by anyone that signs up. The trip will take in London, Paris, Geneva, Rome and Berlin and will last for three weeks. We will be flying by chartered jet across the ocean and by the scheduled airlines within Europe. I have arranged the trip so that we will be flying on Sunday both ways. This is the best day to travel since there is little to do in most cities on Sunday, with the exception of Paris where we will be able to see the Louvre, the Eiffel Tower and the Flea Market on our first Sunday and in Rome where we will see the Pope and be blessed on our second Sunday.

The plane will leave Idlewild airport in New York at around 9 PM on Sunday October 6th and arrive at London airport the next morning. Chartered busses will take us to our hotel, where reservations will have been made for everyone. The rest of the day will be free for you to get settled in your room and venture out to see London. I highly recommend a book called, "Europe on $5.00 a Day" for the inside scoop on how to get around, where to eat, and where to shop. This book is fabulous and a must for any traveler who is in the slightest interested in paying European prices in Europe instead of U. S. prices. I have traveled all over Europe and kept my expenses for hotel and all meals within the $5.00 a day. This book is available through the Radio Bookshop (page 73) for $1.95 in the just out 1963/4 edition.

Tuesday will be spent in sightseeing, climaxed in the evening with a get together with the London hams for a buffet and some drinks. Invitations can be arranged at this time for visiting local hams with interests similar to yours. We'll try to plan meetings like this for every city. Remember, London is one of the best cities in the world for men's clothes . . . and the gals can load up on Aquascutum clothes at considerable savings over the U. S. prices.

I've tried to arrange the schedule to fit the cities. Paris has much doing on Sunday so we spend one of our two Sundays there. The hams in each city will be there to greet us and help to show us around. I'll have maps of the various cities for you plus some notes on places that I've found well worth visiting.

Paris is wonderful for shopping, with several big department stores and thousands of little shops. And the restaurants . . . wow! For instance there was the little left bank restaurant where Virginia and I both had delicious steak dinners, complete with big bottles of wine for only $3.50 for the two of us. A visit to the Lido nightclub is more expensive, to be sure, but I guarantee that you'll never forget that night as long as you live.

Geneva has been included, not only to give you an extra country, but to give you a taste of truly international shopping. The best of the entire world is imported here . . . goods you won't even find in New York City. Here you can visit the famous 4U1ITU station.

Then comes Rome. Those of you who are more athletically inclined are urged to try your hand at renting a Vespa or Lambretta and seeing Rome that way. There is lots to see . . . and lots to eat. You'll flip over Italian ice cream.

Berlin. One of the largest cities in the world and certainly the most dramatic is Berlin. The stores are crammed with marvelous goods . . . beautiful dresses, coats. The Berlin zoo is world famous. The Berlin subways are excellent. And then there is East Berlin. We will schedule a tour of East Berlin . . . something you'll be talking about for a long time to come.

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Paris isn't the only city with famous nightclubs. The Resi in Berlin is world famous and you will never forgive yourself if you miss it. The last time I was there I spent about a dollar on drinks and had the time of my life. Every table has a telephone and a pneumatic tube. You can look around (providing the XYL is at another table or back home) and note the table number of someone that looks interesting. Write your note, put it in the tube and wait to see what happens. Sometimes a note comes right back and sometimes the phone rings for you. With a little courage you'll have a lot of fun and maybe even a dancing partner. The fountain show is worth the visit, even if the XYL won't let loose for an evening. Then there is the Golden Hufiesin, a night club where you can ride a horse on the dance-floor/riding-rink. I did it.

I'm trying to think of everything so you'll have a minimum of things to worry about. There'll be hotel reservations in all cities, complete with breakfast. You'll be on your own for lunch and dinner, except for hints I'll have for you and notes from the $5-a-Day book. This'll give you a lot of flexibility. I might suggest that you try at least one Chinese meal in each country you visit and be amazed at how something like this can vary so completely.

The trip will last three weeks and the total cost for the two-way jet flight across the ocean, commercial scheduled airline flight from city to city, all hotels, including breakfast, busses to the airport and hotels, and a tour of East Berlin will only be $550. This may go up a little bit if we have less than 150 on the trip, probably running $585. When you consider that the cheapest air rate to Rome normally is $630 round trip you can see that we have ourselves a bargain. We can take 150 on this trip and no more, so the first 150 reservations will have to be it.

If you want to go on this tour you must have at least one member of your immediate family as a member of the Institute of Amateur Radio and they must have been a member for at least six months before the trip. Send me your name, call, and $250 half payment (made out to the Institute of Amateur Radio) for each person in your family going to officially reserve seats. The balance will be due sixty days before blast-off.

This will be something that you will remember as long as you live. You may have other chances to get to Europe some day, but you'll

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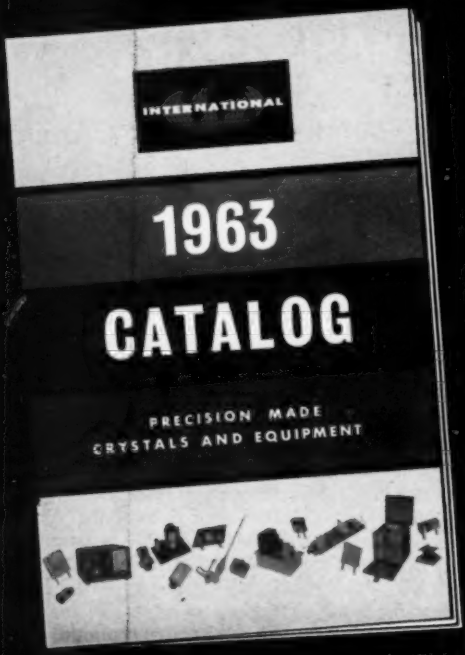

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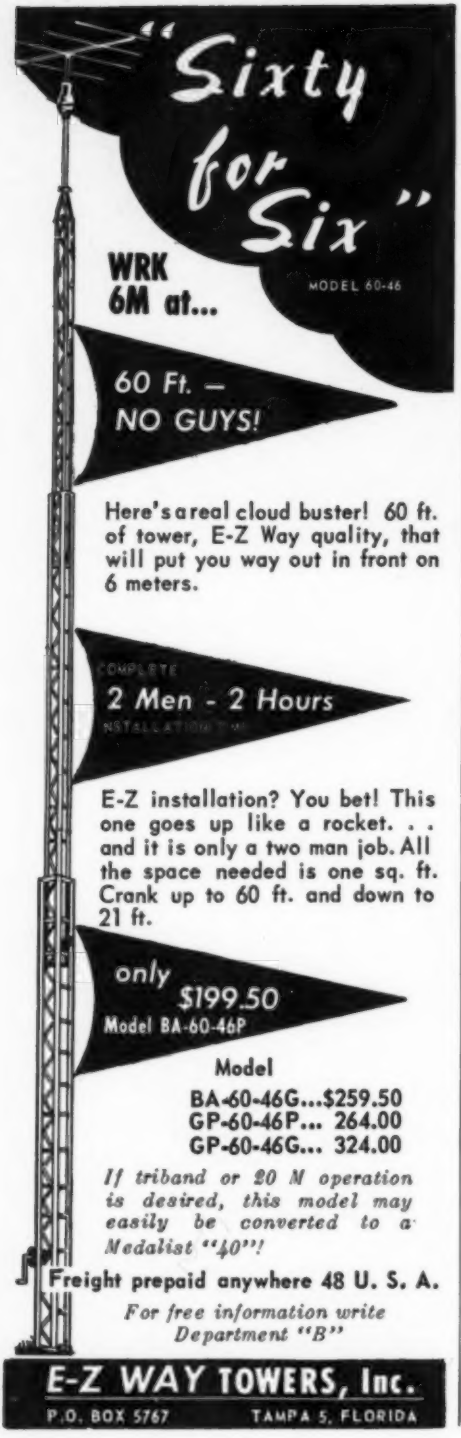
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never have a chance to do it along with a friendly group of hams this way and you won't get to meet the DX hams en masse like this either. Forget the expense, even if you have to borrow a little or settle for a smaller car to make it, for this will be one of the best investments you'll ever make.

How come October? Many good reasons. Plane fares are a lot cheaper at this time of the year. Hotels are looking for customers after the summer rush is over. You can get better bargains everywhere . . . restaurants, stores, etc. We could never get our large group around during the summer. October usually is very pleasant in Europe . . . sunny and warm, but not hot. I'll give you some good dope on the best clothes to take when you sign up. You can do the whole trip with just one small suitcase.

Remember, first come-first served. Get those reservations in right away and don't take a chance on missing out on this wonderful opportunity.

ACARN

I hate to keep grumbling about the same things every month, but whenever something I think is rotten comes along I frustrate until I see it put right. It bugs me. I pace around and worry. That stupid little mimeo machine out in California sending out hate propaganda under the titles of Anti-Communist Amateur Radio Network (ACARN), Amateur Radio Americanism Network (ARAN), and now the National Radio Relay League (NRRL) has the paint worn off my office floor. The brains out there must be paper-thin to accommodate such narrowmindedness.

National Radio Relay League indeed! The purposes of this organization include opposition to the U.N., breaking off all amateur communications with communist countries, and representation of American amateurs before Congress, State Department, Defense Department, FCC, and at international conferences. Let's take a good look at this interesting program.

The UN may be struggling along making a lot of mistakes, but it is the only world group we have. We should be making efforts to improve the UN and correct its deficiencies instead of trying to get rid of it when it doesn't do what we want. A couple of jet plane rides might convince even the die-hard isolationists that our world is pretty small today and not getting one bit larger no matter how far the

(Turn to page 76)

BRAND NEW FROM CLEGG LABS . . . THE

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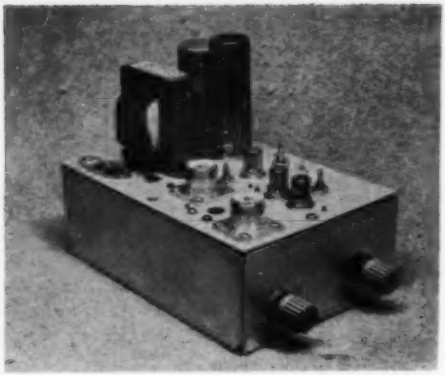


Corner view of completed pre-amp showing the bias control to the left, and the muting wafer switch to the right.

John Wonsowicz W9DUT
4227 N. Oriole Ave.
Norridge, Illinois

A new approach to nuvistors

Two Meter Pre-amp

NUVISTOR VHF pre-amplifiers achieved national popularity almost over night. Most two meter operators have one, are building them or are in the process of gathering components. The RCA 6CW4 is the most desirable little thimble ever to reach the hands of the VHF man and if used properly becomes a very useful device. Unfortunately many homebrewers mis-use the tempermental gem by applying too high of plate voltage or by inadequate shielding which results in too high of noise figure or worse yet, oscillations.

In designing this pre-amp many facets of circuit configurations were considered and the one most appealing in all respects is the grounded grid layout. This type of circuitry exhibits unusually low noise and has an edge on the cascode or the ordinary neutralized-triode amplifier. However, the voltage amplification does not come up to the latter circuits, so two stages must be used to bring it up to par.

In preliminary designs, many hours were spent in observation of the behavior of the 6CW4. Various tricks have been tried and evaluated and some of these are as noted:

One of the most contributing factors in the noise department is the application of plate voltage in excess of 50 volts. Although the gain per stage will increase with higher plate voltage, the circuit and tube noise goes up with it, so nothing is gained. Plate voltage between 25 and 50 volts seemingly gives the best signal to noise ratio and such voltage should be used in at least the first stage.

Another item well deserving of mention is the link coupling between stages for purer signal transfer. It's a known fact that capacity coupling between stages is a lot easier to deal with, but one must realize that in such coupling the spurious signals as well as electrical disturbance like to ride through to contribute to additional noise in the circuit. Link coupling used in this amplifier is quite simple to make, and the drawing shows how to modify the coil forms for securing such extra coil windings to the wire tabs.

Shielding between input and output circuits, as well as between stages is very important when using high gm. tubes, therefore it is of utmost importance that most effective partitioning be utilized in such circuitry to prevent uncontrolled regeneration, which eventually throw the stage into oscillation, piling up additional work in ferretting out such troubles for eradication.

One rather astonishing factor observed during experiments with the 6CW4 is that the thimble adapts itself beautifully for tandem element connection where two or more tubes can be tied together to realize an overall increase in gm. The sockets are so small that the increase in inductance and stray capacities when connecting elements in parallel play an

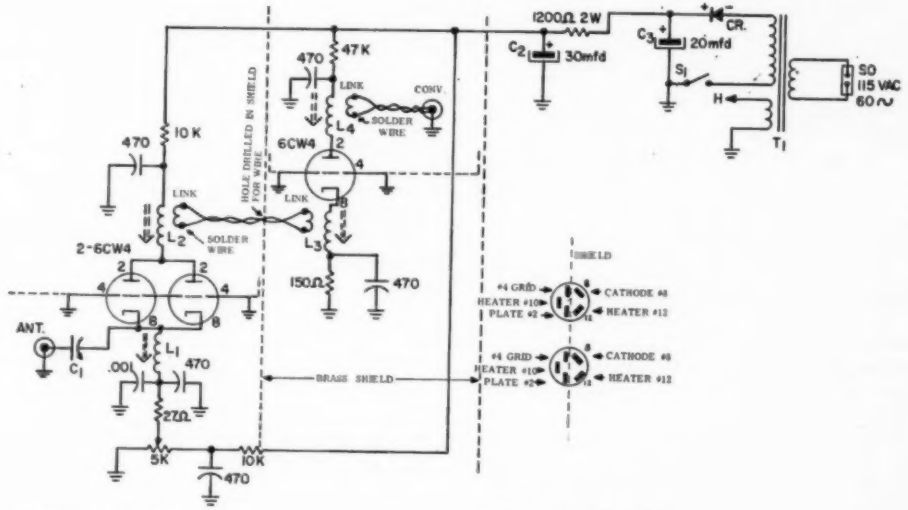
insignificant part in the tank circuit coils design. Tank circuits can be wound with high L to C ratios as though only one tube was used, and such high L to C ratio tuned circuits are desirable in broad band application of pre-tuned stages, especially in the pre-amp stage that must span 4 mc.

During these experiments, two nuvistors were connected in parallel to compare the effects and evaluate the difference between one high gm tube of 25000 u mhos and the combined gm of 25000 u mhos of the two 6CW4's. The circuit used is the herewith described grounded grid system in both cases and supply voltages varied. Each circuit was peaked and pruned for the highest gain, lowest noise and best sensitivity. Well, as you have guessed, the tandem nuvistors had an edge on the single tube. This is due to the fact that the elements of two tubes connected in parallel exhibit a lower plate resistance. Actually in such configuration the Rp is cut in half, and the gm is doubled, but the RL which in this case is the XL (the reactance of the tuned circuit at the operating frequency) remains unchanged. Appying these parameters in the votage ampification equation, it is apparent that higher gain can be realized from such an arrangement. This was further proven by removing one nuvistor from the circuit, re-peaking the stage and noting that approximatey 6 db attenuation resulted in gain and the sensitivity had dropped appreciably.

Top of plate chassis, showing placement of components. The three coils in the foreground are the type used in the amplifier.

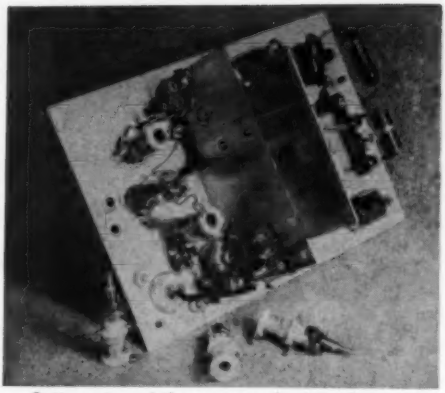
Another noise reducing idea that works nicely in a audio pre-amp was tried to further increase the performance of this stage. It is the application of dc to the heaters. This looked good in theory, but did nothing in practice, so it was discarded for the ordinary ac one side grounded system.

Last but not least, attention was centered on the input circuit to compare the various methods of antenna-to-cathode coupling. Considerable time can be consumed on such comparisons, but such time is not wasted if desired results are obtained. After many tries of tapping various turns on the cathode tank coil



T1—Stancor #PS-8415
CR—Silicon or selenium rect.
S1—Standby switch, Centralab type 1460
C1—5-30 mmfd ceramic var.

C2—30 mfd 150 volt
C3—20 mfd 150 volt
All other capacitors—RMC discaps
SO—TV type ac male conn.



Bottom view of the pre-amp showing placement of components and brass shields separating coils and socket pins.

and using a plain link, also a tuned link, the direct coupling to the high side of the cathode coil L1 through C1 proved the best method. Needless to say, it is also the easiest in low impedance devices.

Construction

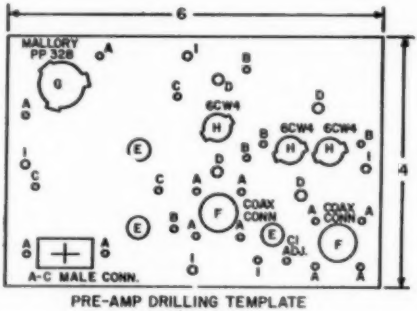
The chassis used in the final assembly is made of 1/16" aluminum stock and measures 4" x 6". A bud aluminum chassis 4x6x2 No. AC-431 serves as the shielded base. Using a plate for chassis has many advantages in punching and drilling not to mention the ease of soldering components in the hard to get at places. (Those of you that would like to duplicate this unit can obtain a paper drilling template for the chassis by mailing a self addressed stamped envelope to the author). The rear part of the plate houses the half wave power supply and the front part is used as the amplifier with input and output coax connectors. As seen in the photo, the power supply has a OB2 as the voltage regulator; this is not used in the final arrangement due to the low voltage required for good performance and voltage regulation is not required. The power transformer is a Stancor PS8415, rated for 125 volts at 15 ma. The heater winding is 6.3 volts at .6 amp. A silicon, or a small 65 ma selenium rectifier can be used in the half wave design. A stand-by switch is provided opposite of the rf gain control to mute the amplifier, if so desired.

As shown in the schematic, the 6CW4's are operating in a grounded grid configuration. The first stage carries two nuvistors for gm doubling and the second stage uses a single grounded grid nuvistor. Thin brass shields secured to the chassis plate by 2-56 screws and cut out for a good fit around the tube sockets, separate the cathode input circuit from the plate circuit. This shield also serves as a ground plate to which RMC ceramic disc cap capacitors, one side of the heater, and the grid of the 6CW4 in the related circuit are soldered to. Other shields made of the same material and fastened to the chassis plate isolate the coils from one another. These shields can be tied together by 2-56 screws and nuts or soldered together at the joints. Solder is preferable for a better contact connection.

Coupling from one stage to another is made through holes drilled in the shields and links are connected by a twisted wire fed through, as shown on the schematic. In this fashion any capacity appearing between stages or between tube elements is grounded to the adjacent shield, thereby eliminating capacity feed-through of spurious signals.

Adjustable bias control labeled as the rf gain is provided on the front part of the unit and connected with 3 wire flexible cable to cathode resistor, ground and B+. This control which is placed in the frount part of the Bud chassis is used to highly bias the first stage, thus eliminating over-loading and distortion on very strong local signals.

The coil forms used in this pre-amp are ceramic slug tuned forms obtained from J. W. Miller Co. and are labeled as 41A000CB1. Although various types of Miller coils can be used in this application, these particular coil forms are the best that I have used in such designs, because they are easy to modify. It is possible to put several windings on these small ceramic forms by simply inserting wire tabs in the moulded holes of the ceramic flanges to secure the windings. Three of the coils used in this pre-amp are modified by inserting such wire tabs for securing the ends



PRE-AMP DRILLING TEMPLATE
(TOP VIEW)

A—4-40 tap, B—2-56 tap, C—6-32 tap. D—3/16" drill, E—⅜" drill, F—⅝" punch, G—¾" punched and cut out for cap., H—31/64" drill and cut out for sockets, I—#28 drill.

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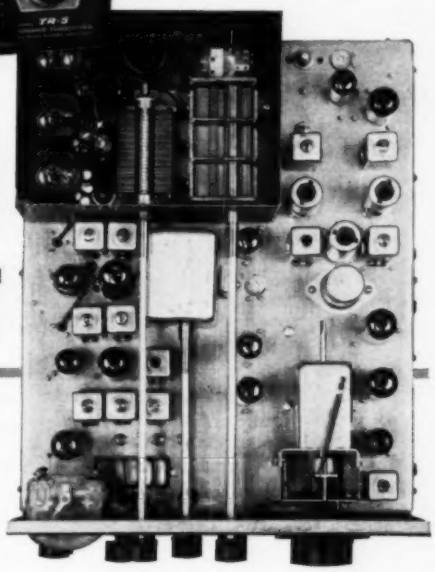
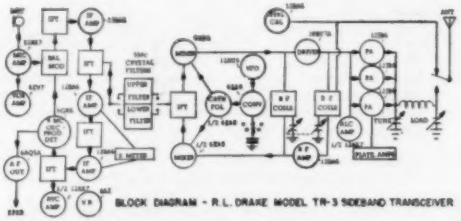
TR-3

300 Watt Sideband Transceiver

By the same people who make the Drake 2-B Rcvr



- **FREQUENCY COVERAGE: Full coverage on all bands** 10 thru 80 meters
- **POWER INPUT:** 300 watts P.E.P. using **3** 12JB6 output **tubes**
- **SSB UPPER and LOWER SIDEBAND** using two special 9 MC crystal filters for sideband selection. Selectivity 2.1 KC at 6 db.
- **LINEAR PERMEABILITY TUNED VFO**
- **SEPARATE RF and AF GAIN CONTROLS**



BLOCK DIAGRAM - R. L. DRAKE MODEL TR-3 SIDEBAND TRANSCEIVER

- Shifted carrier CW
- Provision for accessory AM screen modulator
- VOX or PTT
- Full AVC
- Separate receiver S-meter and transmitter plate ammeter
- 100 KC crystal calibrator built-in

Dimensions: 5⅜" high, 10¾" wide, 14¼" deep
Weight: 12 pounds

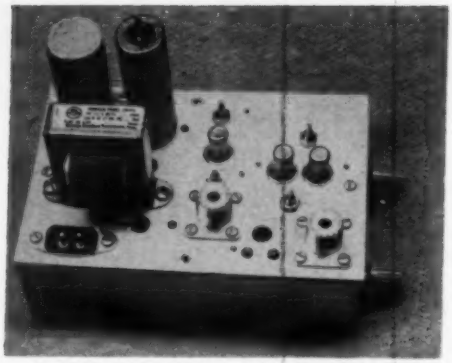
ALL THIS FOR ONLY **$495.00**

AC-3 A-C Power Supply
DC-3 Power Supply

Prices to be announced

Write for FREE TR-3 Brochure

R. L. DRAKE COMPANY Box 185-AB MIAMISBURG, OHIO



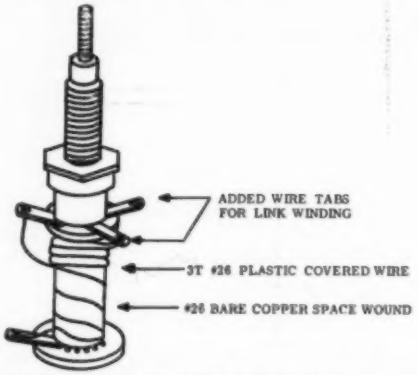
Top view of completed pre-amp. The two in line nuvistors to the right of the unit are tandem connected.

of the link winding. The tabs are made of No. 26 bare copper wire in form of a hair pin loop, pushed through the moulded holes in the top flange of the coil form and then bent downward and cut off to the desired length. You now have a very good tie point for the link coil which is wound with No. 26 or 28 plastic covered wire. These links are close wound on the upper section of the form (cold end of the coil) and then the main inductor is space wound below. See coil data for wire size and number of turns.

Performance

In evaluating the performance as an individual unit and also as a combined receiving set up, the following has been noted.

Sensitivity measurement with the aid of a calibrated attenuator on a Model 80 signal generator was better than .1 u volts.



L1-L2-L3-L4—J. W. Miller ceramic form 41A00C81
L1—5T #26 bare copper space wound (no link)
L2-L3-L4—5T #26 bare copper space wound below the 3T link winding

The gain of the bare unit was 28 db measured with the Model 80 calibrated attenuator and a Sylvania VTVM.

Noise figure measured with a Sylvania 5722 diode noise generator was under 3 db.

Tuning the Pre-amp

Most of the electronic enthusiasts do not own laboratory test equipment for precise testing and evaluation of their newly constructed, or acquired gear and must lean on the designer's findings for performance, specifications, method of tuning and operation. In this paragraph we will only state the method of tuning without laboratory instruments; the rest of comparisons must be made by aural comparison of associated gear and individually evaluated.

To proceed with alignment, first adjust all powder-iron cores in the ceramic coil forms approximately half way. Connect the two-meter antenna to the input coax connector, and the coax output connector to your two-meter converter. Tune your receiver until you hear a weak station, and then adjust L3 and L4 for maximum gain. After the signal is peaked, adjust L1, L2 and C1 for the best signal-to-noise ratio. That's all there is to it. Of course you won't be able to talk true performance specs, but you will have a receiving set-up that will dig deep-in-the-mud and bring out the signals with readable clarity.

My thanks to K9EPB, Howie Trieb for processing the pictures. . . . W9DUT

Parts Kit Available

A complete set of the parts required to construct this unit is available from 73. The normal net price of these parts is a bit over $22.50. The 73 parts kit price is only $18.50. This includes the nuvistors, sockets, all condensers, resistors, power supply, pots, coil forms, connectors, etc., plus a full scale chassis template. Send order to 73, Peterborough, N. H.

Letters

Dear Wayne,

In the scope article, January 73 page 52, you should have mentioned that phosphors P1-2-4-5-11-15-20-24 are OK for monitors, but P7 has too long a persistance. Also, beware of bargains such as the 5FP—series that require magnetic deflection. In Fig. 13 it is not possible to operate the scope tube with both the deflection plates and the cathode at ground potential.

Harvey Pierce WϕOPA

Wayne:

I have an old Howard Model 435A communications receiver which has been converted to Model 436A. If possible, I would like to get some service information on these models so that I can restore it to new condition.

Jack W. Riggs WA6KIH
1055 Via Granada
Livermore, California

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14 TUBE Superhet:
Sensitivity: (.1uv at 6 db S/N)
CD APPROVED
. . . MINI-LOAD VFO
. . . Dual Nuvistor RF amplifier.
Output: 10 watts plus

6 METER transceiver
transceiver

POLY-COMM 6 PC6 AC/DC $329.50
POLY-COMM 2 PC2 AC/DC $349.50

Above prices include microphone and mounting bracket

transceiver
transceiver
2 METER

19 tubes, 10 diodes . . . triple conversion . . . stable squelch . . . super sensitive noise limiter . . . Output: 7 watts plus

guaranteed PERFORMANCE guaranteed PERFORMANCE guaranteed

Why so many tubes in the Poly-Comm 6 and 2 transceivers when others with half the number say that's more than enough?

For the same reason that only the Poly-Comm 6 and 2 have Nuvistor front ends for unparalleled sensitivity. And an exclusive Mini-Load VFO that maintains virtually zero drift under adverse conditions. And teflon wiring, weather proof speaker, ultra sensitive squelch and noise limiter and steel case.

Let's get back to the number of tubes. We put more tubes in for more even distribution of gain, for greater AGC control, and for immunity to variations in battery and line voltages. And each tube in a Poly-Comm performs one function eliminating excess strain . . . TRANSLATION . . . long term high performance operation. Poly-Comm puts the excess where it counts . . . in the guts and selectivity . . . . not in gingerbread and trim.

In every respect Poly-Comm is designed by professionals for professionals that recognize performance and value. We suggest you check the circuits yourself.

Write for complete catalog and specifications.

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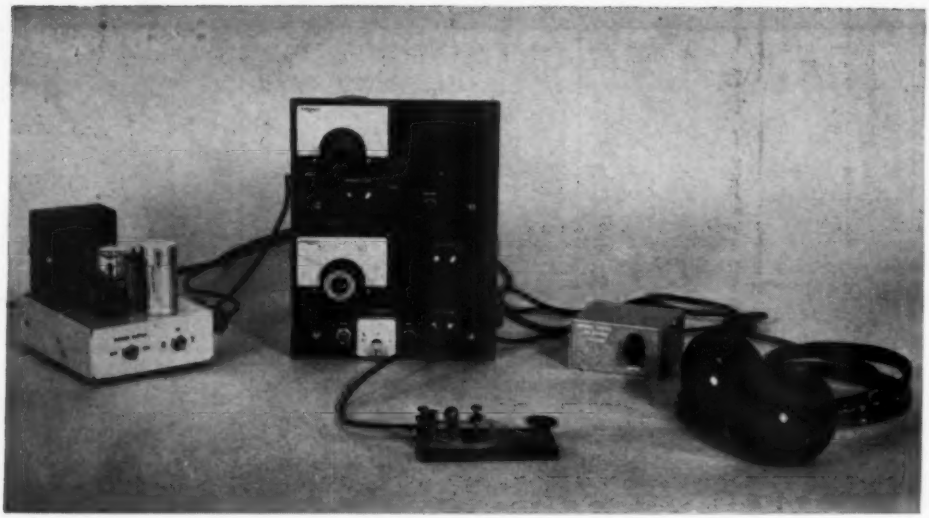

Portable Ragchewer

David Brockman K6LJY
6211 Stearns St.
Riverside, Calif.

WHEN I FIRST conceived the idea of building a portable amateur station, I decided that it must meet three basic requirements: 1. low power consumption, 2. no TVI, and 3. simple. The rig was to be a rag chewer and not a "band blaster." This article is about such a station.

Transmitter

The transmitter uses a 6AU6 in an electron coupled Hartley VFO driving a 2E26 final to about 20 watts. To reduce loading effects, the VFO operates on 80 meters and doubles in the plate circuit to provide output on 7 megacycles. The final operates straight through into a conventional pi-net tank. A simple screen grid neutralizing circuit is employed to insure stability of the final. The final is cathode keyed; the VFO is not keyed to reduce chirp.

Receiver

Prepare yourself for a shock. The receiver uses a simple triode regenerative detector which is transformer coupled to two stages of audio amplification. Regeneration is controlled by varying the detector plate voltage. This receiver circuit produces a readable CW signal with an input of less than .2 microvolt RMS rf. It has a 6 db bandwidth of about 4 kilocycles. With the regeneration set for maximum CW sensitivity, the receiver will "pull in" or block on a signal of about 300 microvolts. This effect may be counteracted by increasing the amount of regeneration.

Construction

At a frequency of 7 megacycles, the circuit layout is not too critical. However, be sure to keep input and output circuits well separated electrically; use shielding if necessary. Also, be careful with transformer fields around the detector. Regen's really pull in the hum.

The VFO grid tank coil, L_1, is made from 22 turns of BW 3008. The tap is 7 turns from the ground end. This coil must be mounted rigidly. This may be done easily by cementing the coil to a short length of ½ inch plastic rod. The rod may then be secured to the chassis with a self tapping screw.

The VFO plate tank coil, L_2, consists of 45 turns of number 34 enamel wire wound on a ⅜ inch slug tuned form. In the circuit, stray and tube capacitance should allow this coil to be resonated around 7 megacycles. Check with a grid dipper.

The final tank coil, L_3, is made from 27

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remotely tuned ROTATABLE DIPOLE!

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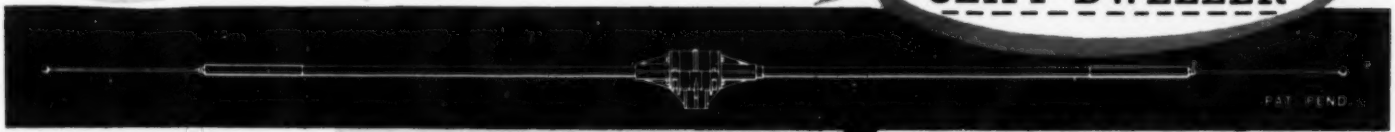
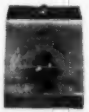
NEW-TRONICS CLIFF-DWELLER®



Housing for motors and gear trains with mounting yoke



Resonance and band switching control

ELECTRICAL FEATURES

- Antenna resonance finger tip controlled from transmitter location in shack.
- VSWR: 1.1 to 1 or less across entire band
- Feed-point variable to compensate for antenna environment
- No traps . . . no baluns . . . no matching devices of any kind
- Feed direct with any length 52 ohm cable
- Power handling capacity — maximum legal limit

The CLIFF-DWELLER is another New-Tronics first. Here's a tuneable dipole ideal for hams who live in apartments or in homes on small lots. The CLIFF DWELLER will give you unbelievable performance even in limited space.

MECHANICAL FEATURES

- Approx. lengths
  - 28′-6″ — 26′ 7.0-7.3 mc
  - 30′-6″ — 26′ 3.5-4.0 mc
  - 31′-4″ — 26′ Two-Bander
- Self supporting, accepts 1¼″ threaded pipe for mounting in standard rotators
- Maximum turning radius approx. 15′-8″
- Sturdy aluminum die cast housing for motors and gear trains which drive end sections of dipole
- Heat treated aircraft type, 1¼″ heavy wall aluminum tubing
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MODEL NO.	FREQ. MC	WEIGHT	NET PRICE
CD 40	7.0-7.3	Under 20 lbs.	$ 92.50
CD 75	3.5-4.0	Under 20 lbs.	99.50
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See the CLIFF-DWELLER and other fine NEW-TRONICS products at your distributor or write us for descriptive literature.

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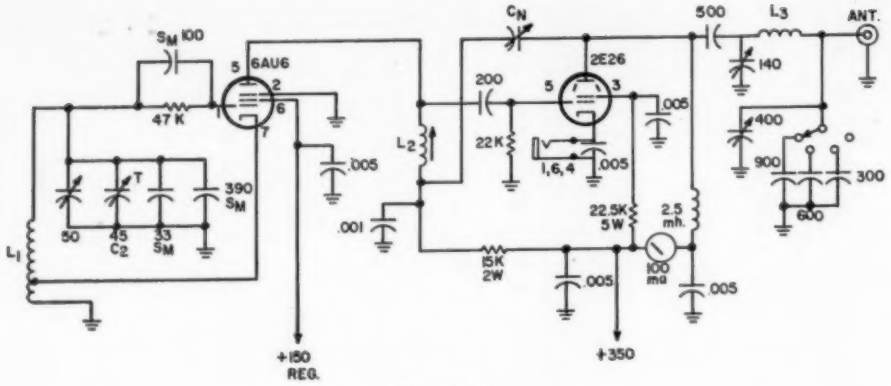


Transmitter

turns of BW 3015. This coil was supported by its leads between the tank tuning capacitor and a feed through insulator on the chassis.

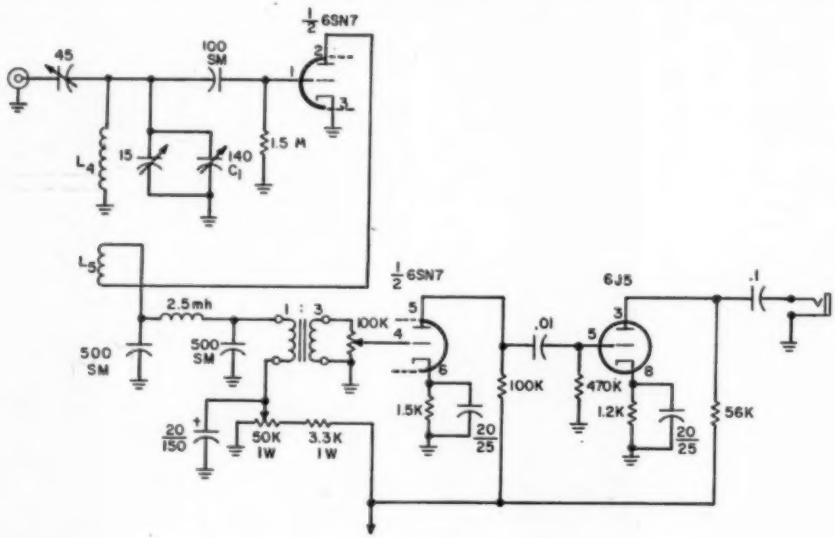
Because of the low final plate voltage (350 volts), the neutralizing capacitor, C_n, is a Centralab ceramic trimmer. This capacitor was mounted on the top of the chassis near the plate choke. Use short leads.

The receiver tank and tickler coils are made from a single length of BW 3011. L_4 has 21 turns and L_5 has 6 turns. Space these two coils ¼ inch apart and in line. In my model, these coils were mounted in a five prong plug in coil form for convenience in experimentation. A more rigid mounting, similar to the VFO coil, would be better. Keep these coils well away from metal surfaces and observe the proper phase relationship with the tickler leads. The lead adjacent to the ground end of L_4 goes to the interstage transformer.

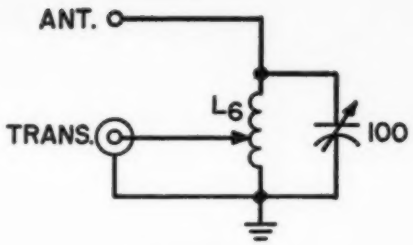
The method of TR switching is left up to the builder's own imagination. Here, I used a three pole double throw relay mounted in the power supply unit for both power and antenna switching. A VFO spotting switch was also included for operating convenience.

Power Supply

The station requires 300 to 350 volts at 75 mils for the final and 150 volts regulated at 25 mils for the VFO and receiver. The heaters require 6.3 volts at 2 amperes. These voltages



Receiver



Antenna Matcher

may be obtained from an existing supply, a Vibrapack or what have you. What ever the source, be sure it's reasonably well filtered.

Calibration

To prepare the transmitter for the air, first remove plate and screen voltages to the final. Next, turn the VFO on and listen for it in the home receiver. Using a known frequency source (home rig VFO), set the low end of the VFO dial with trimmer C_2. The VFO should cover the entire band. If it doesn't, increase the number of turns on coil L_1. Calibrate the dial. Now, with the VFO set at about 7.1 megacycles, couple a sensitive rf indicator to the final tank (grid dipper) and adjust the tank tuning capacitor and coil L_2 for maximum indication. Remember, no B+ on the final plate and screen. To neutralize, adjust C_n for minimum indication. With the plate and screen voltages applied, fire the rig up into a 15 watt light bulb. Touch up coil L_2 for maximum power output and she's ready to go.

To calibrate the receiver, advance the regeneration control until a soft hiss is heard. This indicates that the detector is oscillating and autodyne reception of CW is now possible. Set the low end of the receiver dial with trimmer C_1. During calibration, keep the regeneration control set just a shade past the point where oscillation begins. This is the receiver's most sensitive point. With an antenna connected, the antenna trimmer should be adjusted for best performance. The low end of the dial will probably have to be reset with C_1 to make up for the added capacity of the antenna. Once reset, the previous dial calibration should be OK.

Antennas

The transmitter's pi-network will load a coax dipole fine, however, it is not always convenient to "toss" up a dipole. The simple antenna matcher shown will facilitate the loading of end fed half wavelength wire antennas.

DUMMY (no offense)

LOAD WATTMETER

Guaranteed to survive a 1000 watt (full kilowatt) load for up to five minutes before the built-in bright red warning (we've tried to think of everything) light says OUCH!

This precision instrument is not like those tin can doohinkies . . . no oil to buy (or leak all over everything) . . . no cans to buy . . . no smoke (did you ever smell hot oil smoke? . . . whew!) . . . the whole shebang is only 4¾" x 9¾" x 8¼" and weighs only 12 pounds.

Now, in addition to that dummy load which will sop up all you can legally pump into it, we have a well calibrated power meter so you can see how much soup is really being generated. The meter has three ranges: 10-100-1000 watts.

This is the ideal gadget to connect on that extra Waters Coax (see our ad on page 31 of the January 73 for the cool scoop on our switches. We also make jim-dandy Q-Notch filters as per ad page 55 in February 73 and What Is Its, December 73 page 35) switch position. It is 52 ohms, of course. It'll work all the way up to 200 mc with less than 1.2:1 VSWR (that's good). Yes, we do use oil inside, complete with a safety vent so it can't spill. Available after April 1st for $79.75

Be sure to visit our booth at the SSB Hamfest, Statler Hilton Hotel, NYC March 26th.

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Now . . . stop ignition noise interference at its source without cut-or-try, by-passing, phasing or extra resistance "losser" methods . . . and without impairing the performance of the engine.

Band-spanner Electro-shield System (illustrated) is entirely mechanical, positive, permanent—provides shielded leads and enclosures to shroud completely the entire engine ignition system complex. The **Electro-shield System** is preassembled, ready to install.

Plug shields fit standard and resistor type spark plugs. Molded shield inserts prevent spark-over, also waterproof plugs. Leads to the snap-on plug connectors are **swaged**, won't pull out or loosen when removing shield.

System as illustrated: For 8 cylinder cars.....78.50
For 6 cylinder cars.....66.50

webster band-spanner. 317 Roebling Road, South San Francisco, Calif.

Please send me free booklet "Simple steps to mobile antenna peak performance."

Name

Address No. Street

City Zone State

The coil is made of 25 turns of BW 3015. Adjust the tap and the capacitor for minimum SWR with a bridge.

On The Air

Using the rig described, operating portable from a college dorm with an end fed half wave wire 15 feet above ground, I have been able to make consistently good contacts all over the state. Solid "DX" QSO's with stations in South Dakota, Washington, and Alberta have been had during the evening "rush" hours on 40. RST reports received were 599, 579, and 579, respectively. No unfavorable reports have yet been received.

This little station works. Just remember that it's not a 75A4-KWS 1 and keep out of pileups and you will have no trouble working out. Have fun and look for K6LJY portable 6 on the low end. . . . K6LJY

PARTS KIT AVAILABLE

73 has a kit of parts available for both the transmitter and receiver sections of this combo.

Kit K6LJY-1 Rag Chewer Transmitter.....$24.50
Kit K6LJY-2 Rag Chewer Receiver.....$16.50
(postpaid in the U. S.)

Letters

URGENT

Dear Wayne,

Just solved two problems for you.

1. Limit international QSO's by U. S. amateurs to Extra Class licensees.
2. Limit all QSO's by Extra Class amateurs to international contacts.

These are just the solutions; I don't know what the problems are.

Ken W7IDF

Dear Wayne,

A minor correction on the diagram on page 28, January 1963. The emitter of transmitter Q2 should be returned to ground and not to the —10 volt supply.

Dave Cabaniss W1TUW

Dear Wayne,

I probably should be a bit more formal, but not knowing just what last name you are using this month, I trust you will forgive my familiarity.

The reason for this note?, to enlighten you on the reason we Hams subscribe to the various publications. I attended the Okla. State Convention and fell victim to the HARD SELL. While strolling among the exhibits a Stranger sprang over a table, grabbed me by the collar, dragged me over to the table (in spite of my screams and pleas) rubbed a subscription application to 73 under my nose and twisted my arm until I signed and paid. I've never regretted it. I think your Editorials and

comments are timely and enjoyable, the Writers and Authors qualified, the material well presented, in fact I think I'm getting more than my money's worth as is. I subscribe to several of the Amateur publications and I believe that you have forced an improvement in all of them. I agree with your thinking on ARRL (member here since 1932) and also your thinking on the NUTS from California. My sincere Best Wishes for your future success.

Clyde Steward W5HXK

(Guess I'd better get to more conventions and maybe study up on judo.)

Mr. Green:

I wish to wholeheartedly acknowledge and encourage the staff of 73 to ever increase their efforts of trying to educate the radio amateur in the "state of the Art," especially the technical aspects. It is sad that such a large proportion of us have neglected this responsibility for so long. We are indeed lucky that the FCC has not penalized the amateurs heavily as they might have. Perhaps we would be more quality conscious if they had.

I said that we have neglected a "responsibility." This needs emphasis and elaboration. To begin with, the amateur radio operation we enjoy is a privilege, and attached to it is a respective responsibility or obligation. But what is that responsibility? My definition may not be perfect, but it does carry some truth.

We were given his privilege, at a substantial monetary cost to taxpayers and added hardship to other users of "frequencies," because the government believed that the return would at least equal the investment. One of the most important returns is our contribution to the technical art but generally this has, for the last 20 years, been meager, i.e. in proportion to our size.

I do not advocate that all amateurs become engineers. What I do advocate is a much better balance of our duties. Communicators, contestors, fraternity, etc. we need. But competent technicians are needed even more, and rag-chewers we need much less.

Amateur radio may well be a dying privilege, even now. A great effort is needed to reestablish our usefulness. Your magazine, with its technical bent, is a step in that direction. With your help, and some others, I predict a great revival in that which is supposed to be the essence of amateur radio. Keep up the good work.

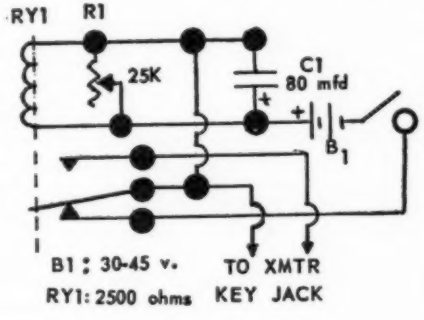
A. Kubicz W8IGJ

Wayne Green W2NSD

On page 20 of the April issue there is a description of an automatic dot maker. This appears to be a most interesting idea for a remote keying unit for a transmitter. I enclose a schematic for a unit that does the same job as the dot maker, a simpler one than the one submitted by Mr. Lee.

The circuit is simply a relay controlled by timing capacitor C_1 and speed controlled by resistor R_1. B_1 is a small 30 to 45 volt battery commonly used in transistor or low-voltage tube radios such as Burgess U30 or Everready #13 and relay RL_1 is a 2500 ohm SPDT relay such as Potter and Brumfield type LB-5.

Gary Budiansky WA2PAX



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Infinite Impedance Antenna Match

Bill Driml W6NAT
252 East Los Angeles Dr.
Vista, California

INFINITE IMPEDANCE MATCH. What does this mean to an antenna? How do we know what happens when we put couple of pieces of tubing together insert coax cable and connect to the transmitter? We had to give it some kind of a name so Infinite Impedance was the closest we came to it.

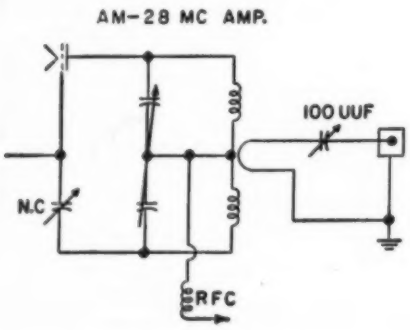
Here are a few characteristics of this match.

1. Weather has no effect on the coupling
2. Very easy to construct
3. Inexpensive
4. It certainly will radiate power
5. Can be used on any frequency
6. Receiving is excellent

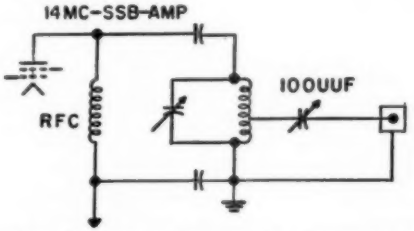
This coupling had been used on transmitters with powers from 5 watts to 1 kw input on 14 mc, 21 mc, 28 mc, 50 mc, and 144 mc at W6NAT, without any trouble matching the load to the antenna.

The coupling is made of RG8/U-52 ohm coaxial cable.

Construction of the match is very simple, remember this is ¼ wave length long. The formula is 468 over freq. in mc for ½ wave and divide by 2 for the ¼ wave.



After length has been determined, measure exact center and cut out about 1" insulation from the coax to the shield. Be careful in cutting so the shield would not be cut through. With the shield bare cut it through at the exact measured center and again be careful not to cut into the center insulation. Peel back the shield and gather the loose ends and twist them together. If the leads are too short solder #14 bare copper to the shield leads for further connections.



Now the same is done to the extreme ends, cut back the outside insulation about ¾" and peel back the shield, then cut the center insulation to the center conductor about ¾" back from the end. After this is done twist the shield wire over the center conductor and solder. Now if you look closely you will find this is a ¼ wave folded dipole.

Next procedure would be to attach the RG8/U chassis connector 83-1R to the center of the coax by soldering one shield lead to the center terminal of the chassis connector and the other shield to the ground portion of the same connector as shown in the diagram.

This connector is not necessary but it simplifies installing the antenna or disconnecting it. The RG8/U feed line can be soldered di-

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rectly to the center shields without the connector. I personally would have the connector on.

Tape up all end connections with plastic electrical tape and also the shield leads on the connector so there will not be any shorts between the match and the tubing of the radiator. The match and the tubing are entirely isolated from each other.

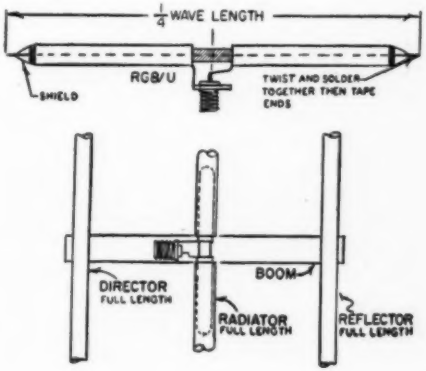
After calculating your antenna elements for your specific frequency and constructing the beam it is very simple matter to install this match inside your radiator tubing. The center radiator tubing should be spaced wide enough so as not to touch the chassis connector.

Some have tried this match just taping it on the outside of the tubing, providing the radiator is cut in the center. I prefer the match inside the tubing. All of the elements are held above the ground or metal boom with stand off insulators.

The coax RG8/U feed line can be any length to the transmitter and a variable capacitor of 100 mmfd or more is connected in series of the center conductor to tune out the reactance of the line. The circuit diagram shown is used at W6NAT's transmitters. With this combination the whole system is weather proofed. The reactance capacitor is mounted in the transmitter and only the coax lead to the antenna is out in the weather. This eliminates weather proofing containers, corrosion, loose connections to elements, etc.

Reports have been excellent on any frequency I have operated with this match. This infinite impedance match has been the simplest combination I have tried and I have tried many types. This match has been in use for over 15 years.

The credit is due to Edwin Dorchester W6DOF of Los Angeles, Calif. who designed this match. . . . W6NAT



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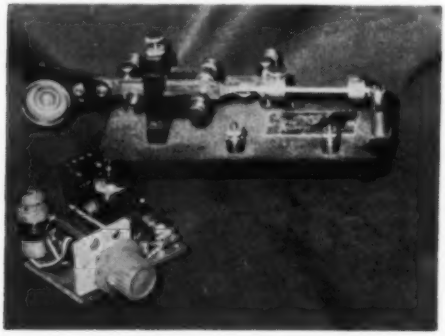
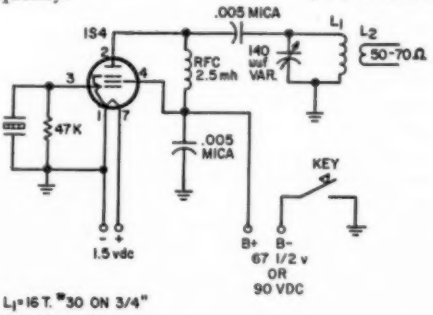
QRP Transmitter

Leonard Tamulonis W1MEL
73 Staff

The circuit shown here is for a teeny-weeny CW transmitter. In spite of its Lilliputian dimensions, it has worked over several hundred miles into Pennsylvania and Ohio on 40 meters from New Hampshire. The 1S4 can be loaded up to ½ watt with a 90 volt battery of the portable B+ type. The whole unit was constructed on a 2" x 2" square of Bakelite with 6" lengths of wire for leads to batteries and key. The little transmitter can be used on other bands besides 40 meters providing that the appropriate L-C circuit is used in the output section, and that the crystal operates straight through on frequency. . . . W1MEL





L1 = 16 T. #30 ON 3/4"
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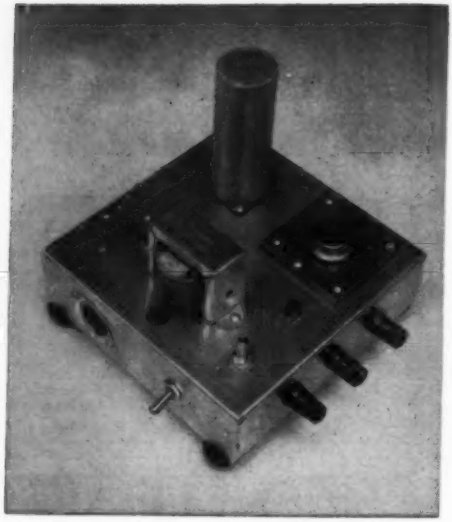

Let's Regulate

Fred Haines W2RWJ

DID YOU KNOW that the garden variety power supply is now old-fashioned? Of course it's still possible to throw a transformer, a couple of diodes and a filter together and come up with a dc voltage output. But did you ever consider the downright bad effects which can arise from the use of such a jury-rigged circuit? Too often a well designed circuit works poorly or not at all simply because of an inadequate power supply, and more often than not, the real trouble is never diagnosed. In this day of transistors the need for better supplies is greater than ever before and this discussion treats of why and how.

The commonest troubles arising from the use of unregulated power supplies are motorboating and low-frequency distortion in audio and video amplifiers. Non-regulation can also be responsible for the untimely demise of transistors due to over-voltage; the use of transistors for fuses in this manner can be expensive! Many specific examples of improvement can be given for the electronically regulated power supply. For example let's assume we wish to build an electronic key. A regulated power source here would prevent any change in the sending speed which otherwise might take place if the line voltage changed. Some day, hook a Variac to a small filament transformer and supply heater current to the oscillator in your VFO from the transformer. Now check frequency stability as a line voltage change is simulated with the Variac. Surprised? It's possible to construct a 6.3 volt transistorized regulated supply for the oscillator heater which will hold at 6.3 volts within a few percent even though the line voltage changes from 90 to 130 volts! In short, these new supplies are so good if properly designed that they can exceed even batteries as direct current sources.

Line voltage variations aren't the only thing we're concerned with here, however. The internal impedance of a supply is extremely important. That is, if the circuit being supplied has a variable current requirement, then does the supply voltage remain constant at light and heavy current output? To find out the dc internal impedance of a power supply, simple procedure and Ohm's Law are all we require. Connect a dummy resistive load representing a light load current to the supply and measure the output voltage. Now substitute a lower resistance representing a high current drain and repeat the voltage measurement. The static or dc internal impedance then is simply the difference in the two voltage readings divided by the difference between the two current readings.

$$R = \frac{E1 - E2}{I2 - I1}$$

For example, a 20 volt power supply is loaded with a 200 ohm resistor. The voltage is read as 20 and the load current is measured at 100 ma or 0.1 ampere. The load is then changed to a 100 ohm resistor, and the output voltage is found to have dropped to 19

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volts. The load current would be 190 ma or 0.19 ampere. Substituting in our formula,

$$R = \frac{20-19}{0.19-0.10} \quad \text{or} \quad R = \frac{1}{0.19}$$

and the internal impedance or resistance of the power supply is found to be 11.1 ohms for direct current. As a rule of thumb, a good regulated power supply will exhibit a dc internal impedance of well less than 1 ohm, and some have been built which go down to 0.005 ohms and less! So you see, the supply we used in our example was pretty miserable. The best part about all of this is that it isn't too hard at all to build supplies with internal impedances of less than 1 ohm.

Then, before we go on to power supply circuits, the ac internal impedance of a supply must be considered. In an ordinary unregulated circuit, the ac internal impedance is the reactance of the output filter capacitor, essentially. And the reactance of this varies directly with frequency, resulting in very high internal impedance at the lower frequencies and progressively lower as the frequency is raised.

Why is the ac impedance important? Well, if the supply has a high impedance at say

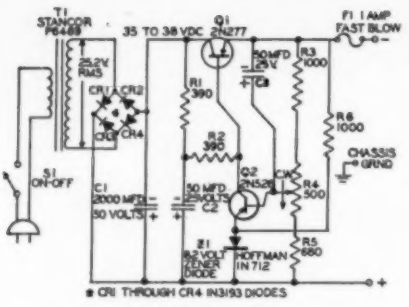

FIG. 1

20 to 30 volt 500ma variable supply. Note: for positive supply output jumper (−) to chassis ground, for negative jumper (+) to chassis ground. All resistors ½ watt.

300 cycles and an audio amplifier is to be operated from it, then common coupling between one audio stage and another will be found, and distortion at 300 cycles can result. Motor-boating is another example of high ac impedance, but this time at a very low frequency, where the reactance of the output filter capacitor has risen to a high value. Electronically regulated supplies have low internal impedances from zero cycles (dc) to several hundred kilocycles, thus simulating battery power supplies closely.

It is true that transistors can tolerate much less overvoltage or drift of supply voltages than tubes without being ruined or at least not operating at their best. This is another good reason everyone should have a good regulated power supply available in the shack if any transistor work is contemplated. The circuits to follow illustrate common transistorized regulated power supplies which have become standard in the industry of late. Circuits of this type can be designed for practically any voltage or current up to the 500 watt class, at which point the new silicon controlled rectifiers become much more efficient, but that's another article!

Referring to Fig. 1, note the similarity to the standard vacuum tube regulated power supply which has been described in the handbooks for years. Since we are using PNP transistors here it is required that we keep in mind the fact that they are "backward" from NPN transistors and vacuum tubes in their action; that is, a *negative* change of voltage on the base turns the collector current *on*. This is just the opposite from NPN transistors and tubes in which a negative voltage swing at the base or grid turns the collector or plate current *off*.

R3, R4, and R5 form a voltage divider across the dc output voltage of the regulator. The center pot connection transfers a voltage proportional to the output of the supply directly to the base of transistor Q2. Q2 compares the voltage sample from the pot with the stable zener diode reference in its emitter circuit. The zener diode, Z1, is analogous to a VR tube and you will notice it is fired through a resistor, R6, from the output of the power supply. Any change in the supply output voltage is thus sensed, compared with a reference, and amplified by Q2. The amplified change is applied to the base of the passing transistor, Q1, and serves to regulate its series resistance to result in a constant supply output voltage. Changes at the supply output can arise either from line voltage variations or from varying current demands of the load. Both kinds of change are ironed out by the regulator circuit.

The supply illustrated in Fig. 1 has a nominal output voltage of 25, with a range controlled by R4 of about 17 to 30 volts. The exact range is determined by the zener diode voltage, and this varies some unless a very expensive unit is used. The current available is 500 ma, and the circuit holds within about 0.2 volt with load current variations from 10 ma to 500 ma! The measured ripple as seen on a high gain oscilloscope is about 0.002 volt peak-to-peak at the full-load output of 500 ma! The internal dc output impedance was measured at 0.5 ohm, which compares favorably with our previous discussion which set up 1 ohm or less as the standard.

The circuit of Fig. 2 was designed to supply heater current to vacuum tubes such as in the VFO heater application previously mentioned. It will supply up to 0.75 amperes at 6.3 volts with excellent regulation and an internal d-c impedance measured at about 0.3 ohm. When this supply is delivering its full rated output

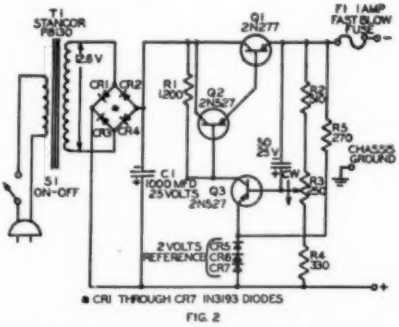

FIG. 2

A 6.3 volt 0.75 amp supply for tube heaters. Note: same note as Fig. 1.

current, a line voltage variation from 100 volts to 130 volts produces a variation of 0.2 volt at the output terminals.

Two interesting circuit variations are found in the 6.3 volt power supply. One is the use of a beta multiplier transistor, Q2. This hook-up results in an increase in the d-c current amplification factor of Q1. If Q1 and Q2 separately have d-c current amplification factors of 10 (beta =10), then hooked up as shown, the effective beta of the combination is 10 times 10, or 100!

The other circuit variation of note is the use of silicon rectifier diodes forward biased as reference elements. That is, a 2 volt zener diode could have been used instead of CR5, CR6, and CR7. The forward drop of a silicon rectifier is about 0.6 to 0.7 volt and holds fairly closely despite applied voltage changes. Three rectifier diodes in series to yield about 2.0 volts cost about half as much as a 2 or three volt zener diode. A good trick to keep in mind!

Now a few words about power transistors, such as the 2N277's used in these power supplies. The wattage dissipation ratings of these transistors are given with the assumption that the user understands the requirement for heat sinking. That is, the metal of the transistor itself does not have enough surface to radiate the heat developed by the transistor fast enough. You will notice then that these boys must be attached to a large mass of metal called a heat sink to carry off and radiate heat. Without a sink, Q1 in either power supply described here would destroy itself within a few minutes. A few mounting tricks must be known before a power transistor can be properly mounted.

Two methods of heat-sinking power transistors can be employed. The first is to mount the transistor directly to the heat sink metal without insulation and then to mount the heat sink to the power supply chassis on stand-off pillars to isolate the collector circuit from chassis ground. This is required because the case of the transistor is electrically connected to the collector of the transistor.

It has been found experimentally that the best simple heat sink for this use is a block of ⅛-inch thick copper about 2½-inches square, suitably drilled to pass the base and emitter leads through and to bolt the stud to the block. The other method of transistor heat sinking is to use the mica washer mounting kit supplied by some manufacturers with the transistor. The transistor is mounted to the metal block with the mica insulator between. The mounting stud then passes through a ¼-inch hole, is prevented from contacting the block by a fiber tube which is passed over the mounting stud, and another smaller mica washer is used under the mounting nut. Sometimes an anodized aluminum washer is used instead of the mica and is about equally as effective. The insulators above serve as electrical insulation, but pass the heat to the heat sink block. Cinch-Jones makes anodized washers, their type 2W-2 for the 2N277. The washers may be used as templates for drilling the required holes in the heat sink blocks. Be sure to drill large enough holes for the base and emitter leads so they will not short out as they pass through the block.

In any case, after you've decided upon a mounting method, check with an ohm-meter on the low-ohms scale to be sure the collector is not shorted somehoy to the heat sink material or the chassis. Perhaps the easiest way of all is to mount the transistor to the copper block directly, and space the block above the power supply chassis on insulators, as mentioned before. The disadvantage here is that it would be easy to short the heat sink accidentally to the chassis, and transistors do not last long when shorted. It has been found advisable to slip short lengths of spaghetti tubing over the base and emitter leads as they pass through the metal block to insure against shorts here.

One last caution; do not omit the fuse in the dc output lead of the supplies. If the output is inadvertently shorted, the power transistor will invariably be destroyed unless a fast blow fuse is used here. By fast blow is meant; not the delayed action slow blow type.

Transistorized regulated power supplies are easy to build, reliable, and produce consistently good results in the operation of transistor circuits. Throw away those batteries, and regulate!

. . . W2RWJ

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SEVERAL MONTHS AGO a few CRU-59 AAE ATJ/ATK Iconoscope equipped cameras were obtained by a local amateur, and a short lived flurry of activity took place as a number of the cameras were put into operation in closed circuit systems. Successful transmission of pictures over short distances was accomplished then the interest subsided and the cameras were set aside to collect dust. WØWPQ Bill Briles and I decided to try our hand at amateur television and were able to acquire two of these cameras, although neither of the units were in operating condition. Surplus cameras of this type are presently available from several sources.[1] Information on ATJ/ATK camera conversion[2] and adjustment was located during the search through back issues of CQ and QST for Amateur Television

Slide Transmission Set-up

construction articles. A power supply and Channel 5 closed circuit TV video transmitter was then assembled to check out the camera and become familiar with its operation and adjustment.

Transmitter, Power Supply & Video Modulator

Television Transmitter

The next step in the project was to design and build a TV transmitter. Up to this point things had been pretty "cut and dried," but now the fun began! We were not able to locate any available information on a 432 mc TV transmitter. The first thing we knew we needed was a simple 432 mc oscillator. Crystal controlled multiplier stages took too many tubes and were expensive.

I obtained a junked APS-13 "Tail End Charlie" surplus radar set which worked on 432 mc. The receiver local oscillator plate line assembly was salvaged and used as the frequency controlling element of the push-pull 6J6 oscillator. The two tubes were mounted on a copper chassis at a canted angle as shown in the photograph. This was done so that the two grid connections would be close together. Short leads are a must at these frequencies. The two ends of the plate lines are attached to the 6J6 plates by short strips of .006 inch brass shim stock. When the oscillator assembly was wired, it was connected to a variable voltage power supply. A blue bead pilot light bulb on a short loop of wire was used as a dummy load. It was found that at 300 volts the oscil-

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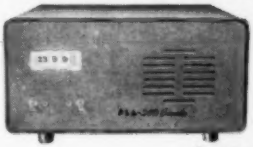

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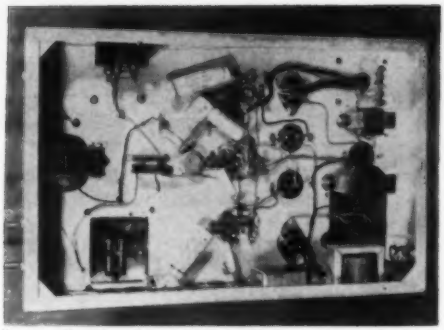


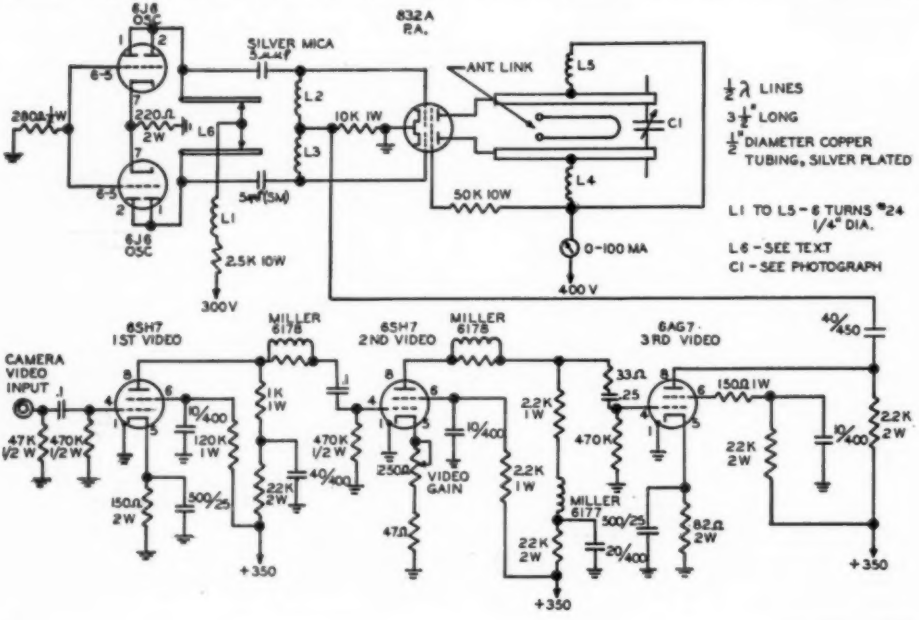
lator drew about 50 millamperes, which is about the safe limit in this mode of operation.[3]

The 832A final socket assembly was fabricated and mounted to the transmitter chassis, as shown in the photograph. The 832A grids were first coupled to the oscillator tank plate lines by running the 832A grid leads parallel to the oscillator plate lines. A pair of half wave, one quarter inch diameter copper, silver plated plate lines were constructed using a modified SCR-522 butterfly condenser to tune the end of the line. The hi-voltage was fed to the cold feed point through rf chokes. When this configuration was bench tested, the output was less than the 6J6 oscillator output. The grid coupling leads on the 832A were replaced with the assembly seen in the photograph. Link coupling was moved from the end of a redesigned plate line to the center, where it belonged. These modifications resulted in the increased output expected from the unit.

The 832A power amplifier is grid modulated by the amplified video signal. The video modulator is similar to the one used in the companion ATJ/ATK camera transmitter. The output tube was changed to a lower output type since my transmitter did not require that much video signal.

Antenna

The antenna used is a 32 element stacked collinear array. Careful attention is required in the construction of the antenna. Be sure that the phasing lines are of the same physical length, and that the phasing line polarity is observed. That is, both left hand bays are connected to the same side of the 300 ohm feeder line, and the right hand bays to the other side of the feeder. The output will be seriously reduced if this is not watched carefully. A quarter wave matching section was designed and installed in the line between the 300 ohm feeder and the phasing lines. This introduced more loss in rf output than it did good, so it was removed. WΦWPQ built his antenna with the two bays mounted side by side. He found that the azimuth alignment of the antenna is much more critical than the stacked array. We have tried out yagis, and collinears and are convinced from our results that the stacked array is the best for this service from an economic,



ease of adjustment, and operational standpoint.

Operation

The complete ATV transmitting station is set up for transmitting either slides or live programs. The slide projector's 150 watt bulb was replaced with a 15 watt bulb and the lens barrel was extended so that it would focus directly on the iconoscope screen. Color slides, as well as pencilled messages on frosted glass slides are transmitted by this sytem. Live programs have been sent using two photofloods to light up the scene. One test included setting up a movie projector to see how movies came over the circuit. The lack of film sync made the pictures flicker like old time movies. Future tests will involve putting a 4.5 mc sound signal on the video channel.

. . . WφRQF

[1]U S #1 Electronics, Denson Electronics Corp., Barry Electronics Corp. and others

[2]Stoner, Surplus, CQ, May, 1957, p. 28

[3]Surplus Radio Conversion Manual, Vol. II, APS-13 Schematic and Conversion Data

Dipper

WE'VE RUN SO MANY test articles on grid-dip meters that you may be getting tired of reading them. Unfortunately, though 73 has had GDO's on test, I've been using the Heath job for quite a few years since it is the only one I've owned. I'm a sucker for advertising though and when I read the ad for the new transistorized dipper in the December issue of us I spent a few days overcoming my natural resistance to spending money and finally ended up sending for one of the gadgets.

I talked myself into this one on the basis that though the Heath dipper works just fine, even after all these years and through several lendings, it does require a modicum of ac for livelihood and thus was not really ideal for use outdoors on antennas. The PEL job is transistorized, has the battery built right in, and weight only 14 oz. Further, it covers all the ham bands from 80 meters right on up through 1¼ meters, plus inbetween the bands. Even the $39.90 price ($29.90 in kit form) seemed reasonable.

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PORTABLE 3 El. 6 meter beam. (50" x 4" folded) Model No. A50-3P $10.95

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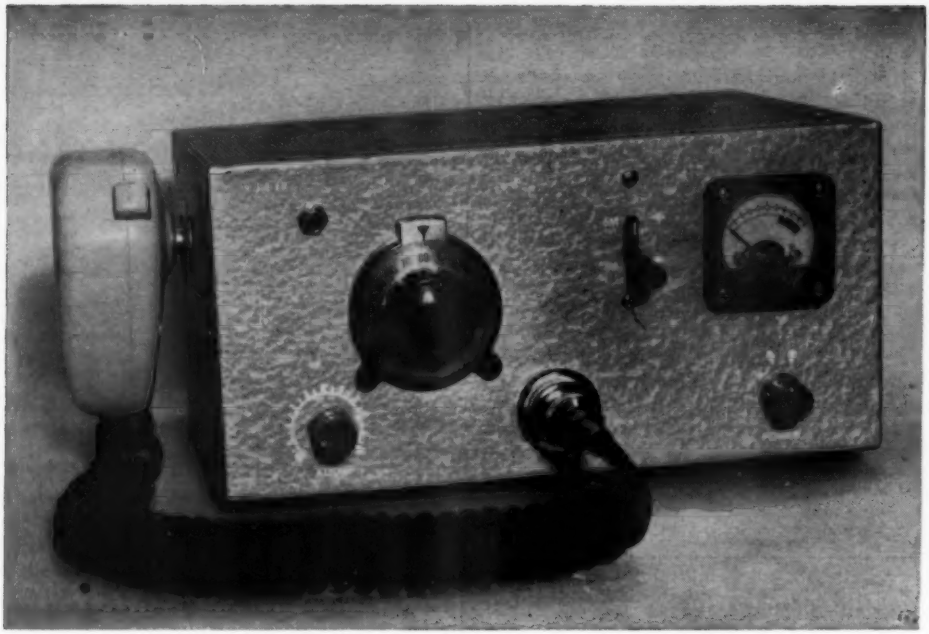


Building a 6 & 2 Portable

Richard Juengel K8KDX/6
2325 Dartmouth
Palo Alto, California

HERE IS A COMPLETE 6 and 2 meter bandswitching transceiver designed to operate from either its built-in 110 volt ac supply or external 6 or 12 volt vibrator supplies. Using only 7 tubes, the rig fits into a 4½ x 9 x 7 chassis box and runs about 5 watts input on both bands. "Bandswitching" may not be quite the right terminology, since actually it is two complete transceivers in one, using common audio and power supplies.

Receivers

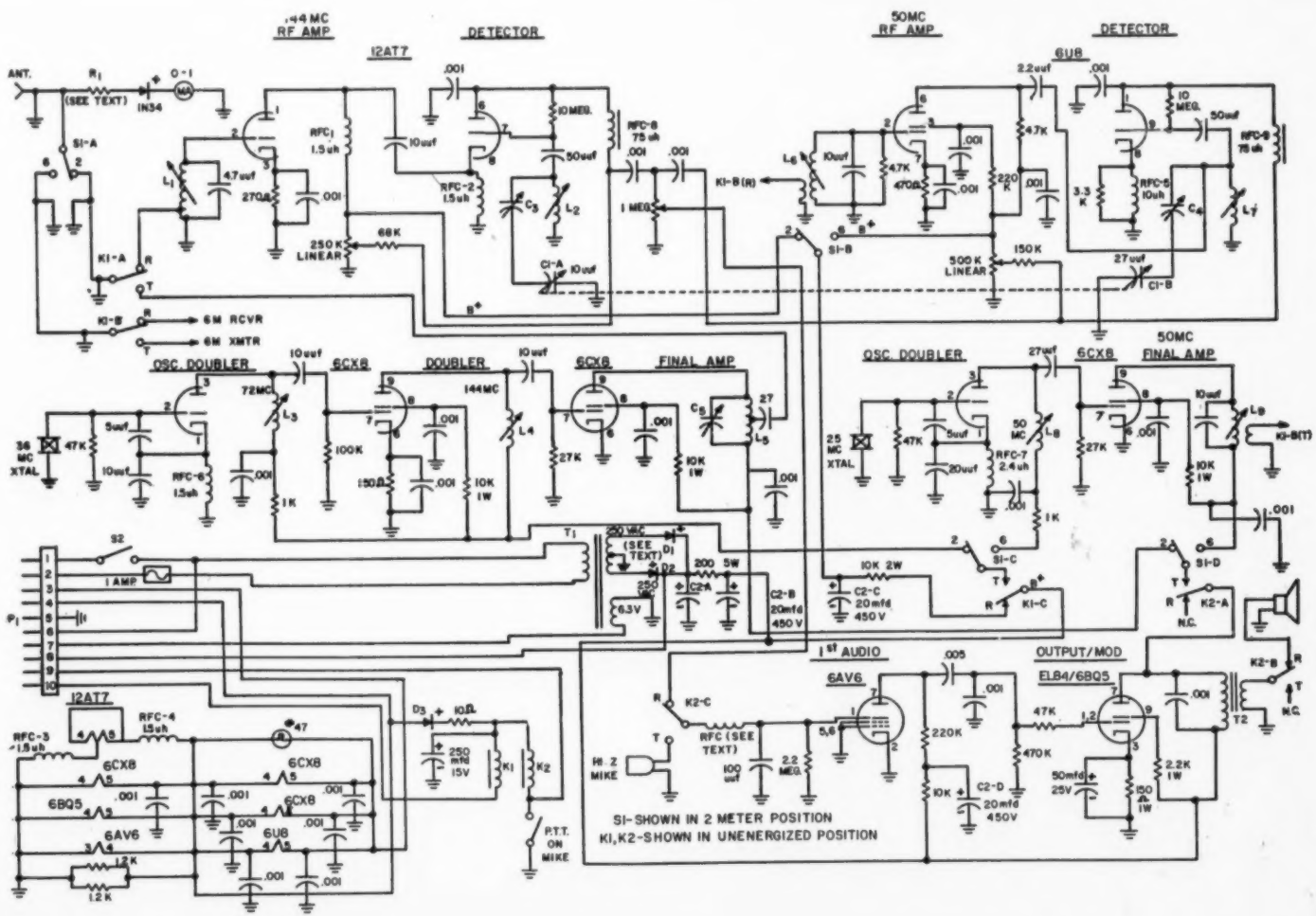
The receiver sections use superregenerative type detectors with rf stages ahead of them to eliminate several undesirable characteristics of superregens. They are patterned after the rceivers used in the Heath "Twoer" and "Sixer," but using tubes more likely to be found in the average hams junk box.

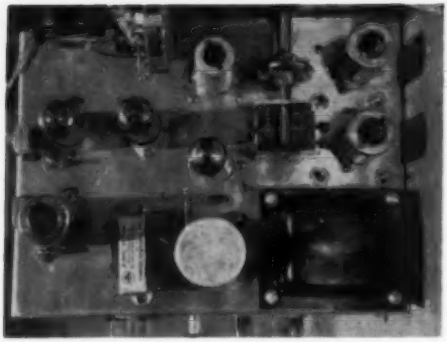
The two meter receiver used a 12AT7, one section operating as a broadband rf stage, and the other as the superregen detector. Similarly the 6 meter receiver uses a 6U8 with the pentode section used in the rf stage and the triode section in the detector. The main purpose of the rf stage is to provide isolation between the detector and the antenna, to prevent radiation and "suck-out" effects. Both receivers are very smooth operating and provide usable sensitivity down to 1 uv or less.

Transmitter

The transmitter sections use 6CX8 pentode/triode type tubes, two being used in the 2 meter transmitter and one in the 6 meter section.

The 6 meter transmitter uses 25 mc overtone crystals in a colpitts oscillator circuit. The oscillator operates at 25 mc and doubles to 50 mc in the oscillator plate circuit. The pentode section operates straight through on 6 meters.


.44 MC RF AMP
12AT7
DETECTOR
50MC RF AMP
6U8
DETECTOR
ANT.
R1 (SEE TEXT)
IN34
O-1
S1-A
K1-A
K1-B
6M RCVR
6M XMTR
L1
L2
L3
L4
L5
L6
L7
L8
L9
RFC-1 1.5uh
RFC-2 1.5uh
RFC-3 1.5uh
RFC-4 1.5uh
RFC-5 10uh
RFC-6 1.5uh
RFC-7 2.4uh
RFC-8 75 uh
250K LINEAR
500K LINEAR
68K
1 MEG
10 MEG.
150K
K1-B(R)
S1-B
C1-A 10uf
C1-B 27uf
OSC. DOUBLER
6CX8
DOUBLER
FINAL AMP
72MC
144MC
36 MC XTAL
25 MC XTAL
50 MC
S2
1 AMP
T1
250 VAC (SEE TEXT)
D1
D2
D3
200 5W
C2-A 250 mfd 63V
C2-B 20mfd 450V
C2-C 20mfd 450V
C2-D 20mfd 450V
S1-C
S1-D
K1-C
K2-A
K2-B
K2-C
N.C.
1ST AUDIO
6AV6
OUTPUT/MOD
EL84/6BQ5
RFC (SEE TEXT)
100 uf
2.2 MEG.
HI Z MIKE
P.T.T. ON MIKE
K1
K2
T2
6BQ5
6AV6
1.2K
S1-SHOWN IN 2 METER POSITION
K1,K2-SHOWN IN UNENERGIZED POSITION



Top view showing layout and parts placement. Band selector switch can be seen in upper left hand corner, next to the meter.

In the 2 meter transmitter 36 mc overtone crystals are used in another colpitts oscillator circuit, doubling to 72 mc in the oscillator plate circuit, then doubling to 144 mc in the pentode section of the same tube. The pentode section of the second 6CX8 operates straight through on 2 meters. The triode section of this tube is not used.

Audio

The audio section serves as both the receiver audio, and modulator for the transmitter. An EL84/6BQ5 type tube is used because of its low drive requirements. The preamp stage is a 6AV6 which provides more than enough drive for the 6BQ5. The output transformer serves also for the modulation choke in this conventional heising modulator. The rf choke shown in series with the grid of the 6AV6 is actually a couple of ferrite beads slipped over the wire. These can be made by carefully drilling a hole through a section of ferrite material obtained from a coil core or loopstick. A conventional rf choke can be used instead if preferred.

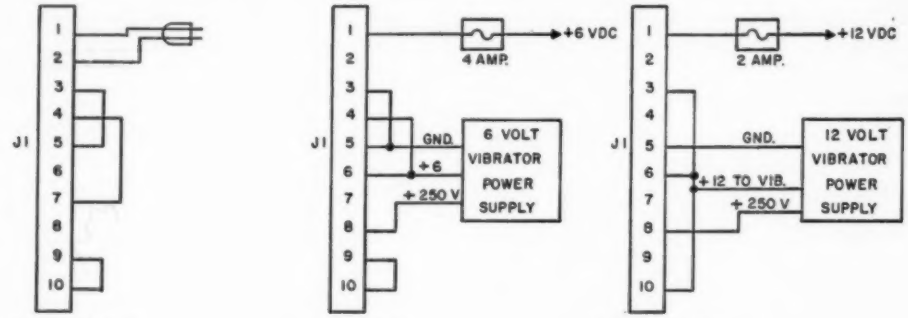
Construction

The rig is built on a California Chassis Co. LTC-464 chassis box which measures 4½x9x7. It is not recommended that anything smaller than this be used as the rig is quite compact as it is.

The general layout can be seen from the illustrations, although this can be altered to suit your fancy as long as things are arranged to provide the shortest possible lead lengths. The dual section 10 mmfd 27 mmfd tuning capacitor shown was obtained from industrial surplus. It is made by the Radio Condensor Co. and bears their part number R/C 273 011, 207, and may be available from them. If not, a small dual section transistor radio variable should be able to be modified to do the job, such as the Lafayette-MS-261. The capacitor used has two plates in the front section in both the rotor and stator and four in the rear section with about a $\frac{1}{16}$th air gap between plates. The power transformer used also was surplus, but anything providing 500v C.T. at 70 ma, and 6.3 vac at 3 amps should do the job. Mine measures 2½ x 3. Start construction by mounting all parts and drilling all holes first. It is advisable not to start any wiring until all major parts that require mounting are at hand.

The coils are all wound on ¾ slug tuned ceramic forms. Notice that the coil in the 2 meter detector is used with the slug removed. Tuning is done by squeezing the turns of the coil together.

Start wiring with the audio, power supply, and switching circuits first. Then the other



Note: For operation from a positive ground 6 volt system, it is necessary to reverse diode D3, and the 250 MFD. filter capacitor.

TELREX "BALUN"-FED INVERTED "V"

INSTALLATION AND TUNING PROCEDURE

MONO-BAND MODELS

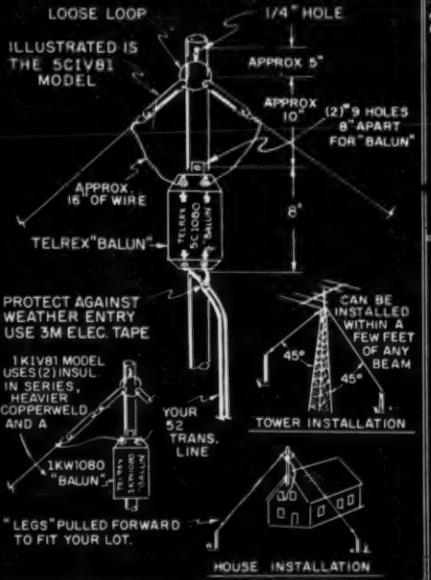
5CIV81 $13.95 RATING 1 KW P.E.P.

or

1KIV81 $17.95 RATING 3 KW P.E.P.

ANTENNA POST PREPARATION

WIRE, INSULATOR AND "BALUN" DRESS TO AVOID PULL ON TERMINALS (LEG SHORT CIRCUIT)



MFD. UNDER TELREX PATENT No. 2576929

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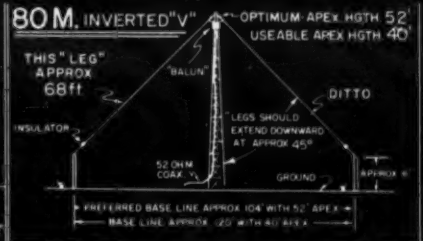
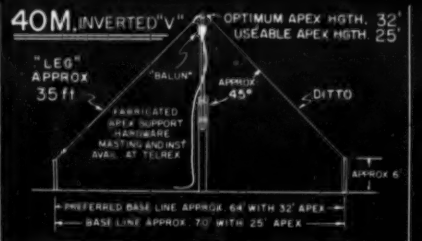
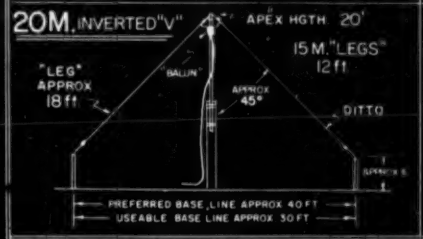
80M. INVERTED "V"



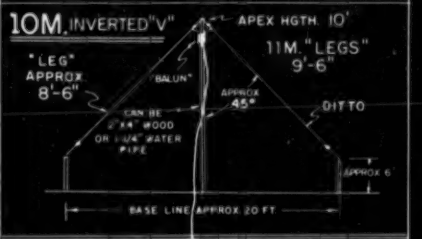
40M. INVERTED "V"


OPTIMUM APEX HGTH. 32'
USEABLE APEX HGTH 25'
"LEG" APPROX 35 ft
"BALUN"
APPROX 45°
DITTO
FABRICATED APEX SUPPORT HARDWARE MASTING AND INST AVAIL. AT TELREX
APPROX 6'
PREFERRED BASE LINE APPROX 64' WITH 32' APEX
BASE LINE APPROX 70' WITH 25' APEX

20M. INVERTED "V"



10M. INVERTED "V"



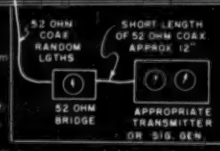
I. V. MONO-BAND TECHNICAL DISCUSSION & INSTALLATION PROCEDURE

1. Install antenna support structures as indicated, in a straight line, in the clear, away from power lines, etc., to assure opt. performance, max. S/N reception, min. S/W/R and easier adjustment of antenna to frequency.
2. The "Balun" fed Inverted "V" automatically provides min. S/W/R over a max. bandwidth when installed at indicated height and base width because the "legs" will approximate a 45 degree angle from the vertical, thus effecting an input imped. of approx 52 ohms.
   Note! The "Balun" fed Inverted "V" lends itself to considerable variation from these definite recommended instructions, although some corrections may be required as indicated below.
3. Properly installed and resonated to freq., a Telrex "Balun" fed Inverted "V" provides an imped. bandwidth of approx 3%, with a S/W/R of 2/1 or less. The pattern is primarily Omni-directional, with nulls off the ends of approx 6 DB.
4. Performance, a Telrex "Balun" fed Inverted "V" is superior to a gnd-plane, or a 1/4 wave dipole with a costly radial system. Do Not install this antenna system, in a horizontal plane, unless you can install it 1/2 wave above ground.

ORDER OF PROCEDURE: 1a. Cut copperweld wire supplied into designated lengths. Assemble to insulator and "Balun" as illustrated. Connect 52 ohm coax trans. line (any length) to input side of "Balun", raise antenna to its prepared supports.

2a. With S/W/R bridge (or sig. gen.) connected as illustrated, check resonant freq. of antenna. In all probability, the antenna will resonate too low, perhaps outside the low end of the band. To correct, shorten each "leg" approx one foot or so, then recheck for resonant freq. Repeat (shorten or lengthen), if necessary, until antenna resonates to your desired band sector.

3a. Note! The antenna must be raised to its intended final apex and end post height every time you take resonant freq. and/or V/S/W/R readings. Properly installed and resonated, the antenna should have a 1.5/1 S/W/R. If necessary, S/W/R improvement can be effected by raising or lowering the doublet "legs" a foot or so.



Send For PL77 — Tech info on 107 Antennas

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ASBURY PARK 31, NEW JERSEY, U.S.A.

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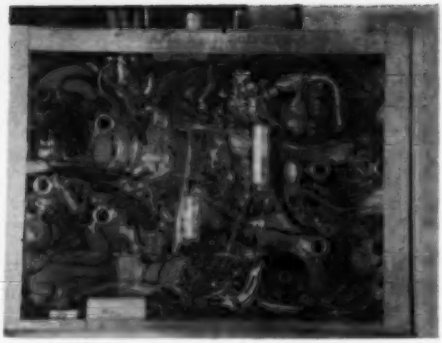
Model No. 1KIV84 (40 & 80 Meters) $35.00 - 3 KW P.E.P.

TRI-BAND KITS - Model No. 5CIV842 (20, 40 & 80 M) $35.00 - 1 KW P.E.P.
Model No. 1KIV842 (20, 40 & 80 M) $55.00 - 3 KW P.E.P.

Many Other Models Available - MONO - DUO-BAND - TRI-BAND - QUAD-BAND - FIVE BAND -



Under chassis view showing parts placement. The two receiver sections are at the right, the audio in the center, and the transmitter sections to the left. Sharp eyed readers may notice the two different relays used, which was an earlier arrangement.

sections can be checked as they are completed. Before testing check the coils with a grid dip meter and set them on frequency. It may be necessary to prune them slightly if your layout differs from mine. Don't forget to put in those filament bypass capacitors.

Testing

With a grid dip meter adjust the detector coils to cover the whole band with a slight overlap at each end of the tuning dial by adjusting the coil and series tracking capacitor as described in the ARRL Handbook. With power applied and the bandswitch in the proper position, advance the regeneration control for the receiver being tested until you hear a "pop" followed by the familiar rushing noise. This control should be set just to the point of regeneration. Check to make sure it stays in regeneration throughout the tuning range. If not, advance the regeneration control a bit further until it operates smoothly across the whole band. If you have any difficulty getting it to regenerate smoothly, try experimenting with the number of turns on the rf choke in the cathode of the detector, or in the case of the 6 meter receiver, the value of the choke and its shunting resistor. If a whistle is heard, such as when the regeneration control is set too high, try lowering the value of the 50 mmfd capacitor connecting the grid of the detector to its tuned circuit. However, if the parts specified are used no difficulty should be encountered. If a signal generator is available, it may be used to final tune the detector for proper coverage and to peak the rf amplifier stage. Some pulling of the detector may be noticed when tuning the rf stage. Be sure to use a very small signal to prevent overloading and misalignment of the detector. Signals down to 1 uv should be readable if all is well.

Transmitter Alignment

Connect a #47 pilot lamp to the output of the transmitter after setting all coils to approximate resonance with a grid dip meter. Adjust the oscillator coil for maximum voltage on the grid of the final, using a VTVM with an rf choke, or 100k resistor in series with the probe. Now adjust the final tank, and position of the link or tap, for maximum brilliance of the pilot lamp connected to the output. Touch up all adjustments for maximum upward modulation with a tone applied to the mike input or when you whistle into the mike. Select a value of resistance for the meter circuit to give a convenient reading on both bands with the rig connected to the antenna to be used. The meter provides a reference reading that can be used to tell if the transmitter is operating properly.

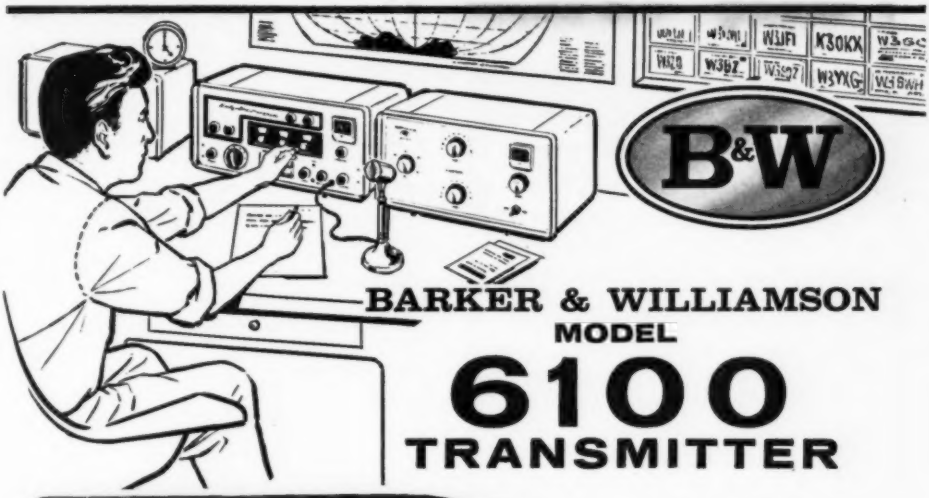
The rig is designed to operate with a two band antenna using a single feedline such as the Poly-Comm, or Hi-Par Halo, for mobile operation or one of several available beams for fixed operation. It may be modified to use separate antennas if desired by eliminating the connection to the bandswitch and running the outputs to two separate antenna connectors.

General

If desired all three power cables can be constructed to provide operation from 110 vac, and 6, and 12 vdc, with the proper vibrator power supply. The circuit is wired such that the vibrator supply is controlled from the switch on the front panel. Vibrator supplies such as the Heathkit should work very well, or one can be constructed around the Lafayette HP-234 Vibrator transformer using the circuit supplied with the transformer. The cost of the rig can be reduced somewhat by replacing the two relays with a 6PDT slide-switch, such as the Lafayette SW-99 at the expense of eliminating the push to talk feature. If operation from all three voltage sources is not needed, some simplification can be accomplished here also.

Although this rig does not represent the ultimate in VHF gear, it does provide very good local coverage and is ideal for mobile or net operation. It should prove to be an excellent club project also. New and better things are now in the works around here in

(Turn to page 38)



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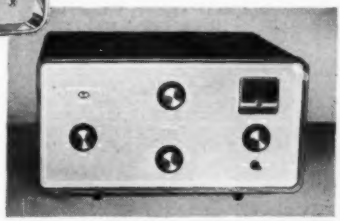

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(6 & 2 Portable from page 36)

the way of 6 and 2 meter transceivers, so in the meantime, have at it fellows and good luck. K8KDX/6

PARTS LIST

C—Dual section 10 mmfd variable (see text)
C2—20-20-20-20 mfd 450 V electrolitic
C3—1-10 mmfd plastic trimmer, Centralab 829-10
C4—7-35 mmfd ceramic trimmer, Centralab 820-c
C5—2.3-14.2 mmfd variable, Hammarlund 160-107
RFC-1, 2, 3, 5, 6,—1.5 uh, J. W. Miller 4604
RFC-5—10 uh, J. W. Miller 4612
RFC-7—2.4 uh, J. W. Miller 4606
RFC-8, 9—75 uh, J. W. Miller 4631 or equiv.
K1, K2—3PDT 6VDC relay, Potter Brumfield KM-14D (see text)
T1—Power transformer 500V C.T. at 70 ma 6.3V at 3 amp. (see text)
T2—Audio output transformer 2K primary to 4 ohm secondary, Stancor A3876
S1—4PDT lever type switch, Mallory 6242
S2—AC line switch rotary type
P1—Jones P-310-AB
J1—Jones S-310-CCT
MA—0-1 ma DC 2 inch meter
*TAL—3rd. Overtone, International Crystal FA-5
D1, D2, D3—Silicon rectifiers, LaFayette SP-241
L1-L4, L6-L9—⅝ ceramic coil form, J. W. Miller 4400

*Note—These crystals are calibrated to operate at anti-resonance and will be from 1 kc to 2 kc low in frequency when operated series resonance in this circuit.

COIL TABLE

L1—3½ turns No. 20 bare, on ⅜ ceramic S.T. form
L2—3½ turns No. 20 bare, on ⅜ ceramic S.T. form (slug removed)
L3—4 turns No. 24 E. on ⅜ ceramic S.T. form
L4—4 turns No. 18 bare on ⅜ ceramic S.T. form ....
L5—6 turns No. 18 bare, air core wound ⅜ dia. ¾ long. Tap at 1 turn
L6—6 turns No. 24 E. on ⅜ ceramic S.T. form with 2 turn link
L7—8 turns No. 24 E. on ⅜ ceramic S.T. form
L8—5 turns No. 24 E. on ⅜ ceramic S.T. form
L9—6 turns No. 24 E. on ⅜ ceramic S.T. form with 2 turn link

Mode Switch for the Eico 720 and 730

James Demler WφDSU

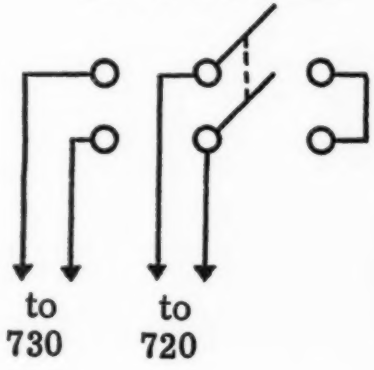
THE EICO 720 transmitter and 730 modulator make a fine transmitting combination, but there is unfortunately no built-in provision for rapid switching from CW to AM. Here is a simple modification requiring only a 2PDT toggle switch and some wire (lamp cord is fine) that will enable you to incorporate a CW-AM switch in the 720-730 pair. It is assumed that the 730's B+ is controlled by an external relay as this makes for good one switch

operation when switching from transmit to receive besides being necessary for the installation of this switch. This being true, the "plate supply" switch on the 730 serves no purpose. By removing this switch and replacing it with another we can add a "CW-AM" switch to the unit. Here's the procedure:

Unsolder, at the plate supply switch, the wire connecting one terminal of this switch to a ground lug. This wire should then be rolled up, taped, and kept inside the chassis. The two other wires connected to the switch should also be unsoldered, however they must remain connected. This connection—as with the previously disconnected wire—should be taped and tucked in some out-of-the-way position inside the chassis. In this manner it will be an easy operation to return the modulator back to its original condition, should you so desire. The schematic diagram of the newly added mode switch is shown in Fig. 1 and needs no explanation. In order to bring out the leads of this switch a "U" shaped hole was made on the very edge of the bottom plate which fastens to the chassis just large enough for the leads going to the switch.

Although I have not tried it, a 3PDT switch could also no doubt be used. The "third" set of contacts could then be used to control the ac power going to the modulator. In this way the modulator would automatically be in the AM mode when turned on, and in the CW position when turned off.

The arrangement shown in Fig. 1 has been in use for some time now at this station and has given me no trouble. It is indeed much easier to switch from 'phone to code with this switch than it is to reach behind the 720 and 730 and plug and unplug connectors every time you want to change mode. . . . WφDSU



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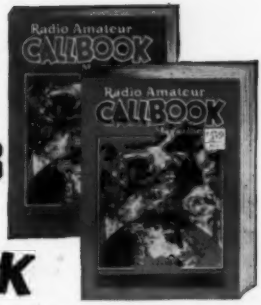

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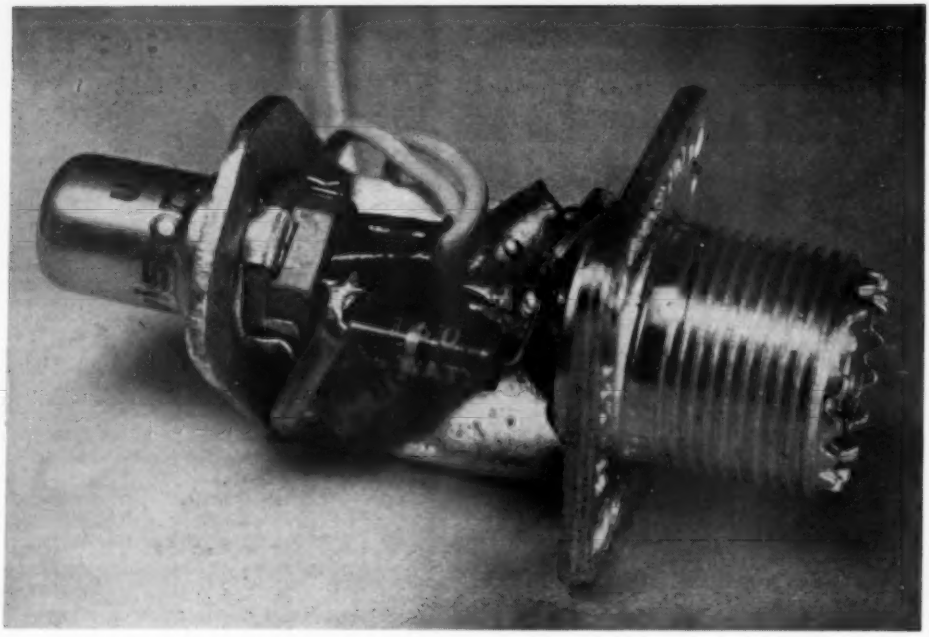

A Simple, Nuvistor RF Pre-Amp

Joe Williams W6SFM
4150 Beck Avenue
North Hollywood, Calif.

THE NUVISTOR is scarcely larger than a transistor but will come close to the 417A in performance and at much less power drain. The transconductance-to-plate current ratio of the RCA 6CW4, 7586, 7587 and 6DS4 series makes them excellent rf amplifiers where high gain and low noise are sought.

Whether we hams like it or not, we are moving slowly but surely toward a sunspot nadir. This means that those of us with inexpensive receivers are beginning to notice that signals just don't have the wallop that they did back in those days when it was almost possible to work DXCC with a window screen antenna. One way to make things seem better is to amplify incoming signals before they reach the receiver. The manner and degree of pre-receiver signal processing is largely a matter of the individual operator's choice. A compact and effective cascode Nuvistor pre-selector has been devised and described by Fred Cupp, K8AOE.*

The single Nuvistor preamplifier detailed here was made to work with a 2 band quad but will perform as well with a folded dipole. It will be noted that the antenna forms the tuned input circuit for the 6CW4. (Fig. 1). The plate circuit for the tube is the antenna input coil of the receiver. Since most receivers have low impedance inputs, a match is obviously not obtained. This causes the input to be relatively unloaded and results in an increase of "Q" in the tuned circuit of the rf amplifier or the mixer. At the expense of some gain, this will improve the selectivity and reduce QRM- and QRN-type noises. The receiver is peaked with the antenna trimmer as usual and the net gain of the preamplifier is about

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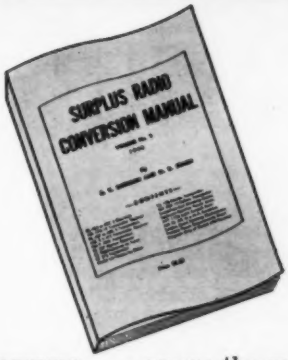

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VOLUME II — AIC; AM-26; APS-13; ARB (Schematic only); ARC-5; ART-13; ATC; AVT-112A; BC-191, 357, 375, 454-455, 457/459, 946B, 1206; GO-9; LM; R-26-27/ARC-5; R-28/ARC-5; SCR-274N; TA-12B/12C; TBW; T-23/ARC-5; Selenium-Rectifier Power Units; Simplified Coil-Winding Data; Surplus Beam Rotating Mechanisms. Book #32C

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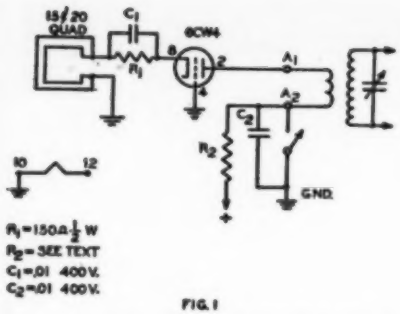

FIG. 1

12 db, or 2 "S" units. The grounded grid configuration of this preamp makes neutralization unnecessary and it should function well at 6 and 2 meters.

Construction

The amplifier proper was constructed so that it could be incorporated into the receiver by mounting the SO 239 coax fitting in lieu of the existing fitting on the set chassis. This requires one square inch of chassis surface and 1½ cubic inches of under-chassis space. From the photo it will be seen that the 'chassis' of the preamp consists of the SO 239 and a 1½ x ¾" scrap of brass. The brass was punched for the Nuvistor socket, bent and soldered to the coax chassis mount. It is intended that the square flange of the SO 239 be under the chassis or behind a panel when the amplifier is mounted on a receiver. Only the threaded barrel and the heads of the mounting bolts would be exposed. R 1, the cathode bias resistor, and C 1 its bypass, are contained within the small chassis as shown. R 2, the plate dropping resistor, and C 2, the link bypass capacitor, are located adjacent to their associated circuits in the receiver. If the amplifier is operated or tested without its being attached to the receiver, remember to connect a jumper between the two chassis to make a heater and plate return circuit.

R 2 is a 5 watt resistor and its value is determined by Ohm's Law. The tube will draw about 10 mils of plate current and 100 ohms will be required for each volt of plate supply in excess of the 75 volts needed for the 6CW4.

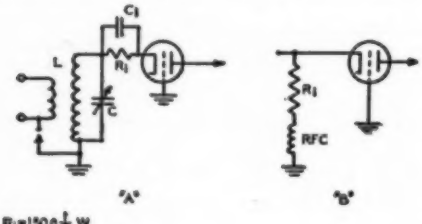

FIG. 2

The Hook Up

The antenna connection on most receivers consists of 3 screw type connectors marked A 1, A 2 and GND. Usually there is a swinging strap that connects GND and A 2 when an unbalanced antenna is used. When this type of preamp is fed into the receiver, the strap is disconnected from A 2 and the A 2 connection is bypassed to ground via a capacitor. (C 2). A 1 is connected to the Nuvistor plate. As is customary, the heater and plate supply for the amplifier is snaffled from the receiver. Pin 10 of the 6CW4 is grounded and pin 12 is connected to the nearest tube or tie point where 6.3 volts ac can be picked up. The plate is furnished B plus through R 2 which is connected between the A 2 antenna post and a convenient bus point.

If this preamplifier is used with an antenna that will not provide a dc cathode return, an alternate input circuit is required. (Fig. 2). The simplest way to use this device with an ac-dc receiver is to use a separate 6.3 volt filament transformer for the 6CW4.

. . . W6SFM

*All Band Nuvistor Pre-Selector, 73 Magazine for July 1962.

PARTS KIT AVAILABLE

As a service to those hams who are a little short in the spare parts department we have available for immediate delivery a kit of the parts used in this preamp. The regular net price on these parts runs close to $5.00 if ordered separately from a standard parts catalog. Quantity buying permits us to sell this kit for $4.00 postpaid in the U. S. Order Kit—W6SFM-1

Letter

Dear Wayne,

Your reader is correct in his Canadian info. The Canadian Ministry of Transport has issued last year a directive whereby "landed immigrants" where eligible for VE calls for at least five years, which is the required period to apply for Canadian citizenship. No previous holding of a license is required. The applicant is treated as a Canadian national.

Upon learning this, and considering that Canada has special privileges for issuance of visas to English and French applicants, due to Canadian history, I immediately petitioned the French Ministry for Telecommunications to extend reciprocity to Canadians in France. The Ministry agreed, but for those Canadians holding long

time residence papers. Through my job, I am familiar with French regulations on aliens in France, I knew that very few, if any, Canadians would meet the requirements. I protested with some documentary evidence and was later informed by the Ministry that, after consultation with other Departments, henceforth any Canadian will be eligible for an F license, irrespective of his resident status. This was reported to Mr. George Hees, Minister for Transport, in Ottawa, with whom I was in contact. A Canadian applied in Paris and was issued the call F8VE.

Considering the rather thorough screening of immigrants in the United States and their obligation to report their residence to the Department of Justice, a step in the direction of making resident aliens eligible for licenses could be considered. In view of what happened for Canadians in France, I am sure it would work equally well for Americans. During the last ten years I have received assurances from the Ministry itself that they have no objection of principle to license anyone, as long as it does not appear as a one side courtesy. Proof of this is the continuing licensing of Americans with F7 calls, without examination, tax or station inspection, for which nobody complains, except for occasional high power phone patching . . . hi.

Bernard Malandain F9MH/W2

But Bernard, until our Communications Act is modified by Congress to permit the FCC to take such measures, no alien, whether an immigrant with first Citizenship Papers, a resident representative of a friendly foreign nation, or a visiting ham can be licensed. This is an unfortunate result of a clause in the Act which was never intended to achieve this result. All of us are victims of this sloppy legislation which was originally supposed to protect U. S. commercial radio operators from lower wage imported help and was foisted on us by our labor unions. Now attempts to correct this carelessness are being fought by a few ignorant but loud isolationists and ultra-rightists, while the rest (for the most part) of us sit by and talk about something more interesting. Now and then some ham wakes up all of a sudden when he decides to try his hand at DXpeditioning and finds that a great deal of the world is pretty bitter about the non-reciprocity of the U. S.

New Products

Miller Catalog

Homebrewers will do well to drop J. W. Miller a line asking for their 1963 catalog. Coils, transformers, chokes, forms, by the gross. 5917 S. Main, Los Angeles 3, California. 48 Pages.

Quaker Kits

Back in November (page 21) we ran a little review of the Quaker crystal grinding kit. The response was so good to this item that Quaker has had to expand their kit line and now has three different models, plus all sorts of additional materials. You should send for their price list and see for yourself. The biggest item now is a whopper kit containing 35 crystals in holders, 15 extra crystal blanks, ammonium bifluoride etch, grinding compound, plastic containers, spoons, and wooden crystal blank holders. $12.50. Write Quaker Electronics, Mountain Top, Pennsylvania.

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RECEIVER

BUYING GUIDE

We sure hope that you'll get a lot of use out of this guide. The brainstorm, if you like the idea, started with the editor back one year ago. This was then transferred to Roy Pafenberg W4WKM who did the immense amount of research necessary. Most manufacturers cooperated on the project, but it took a couple of them almost a full year to blast loose with photos of their receivers and some of the other data. We want to thank Allied Radio Corporation of Chicago, Henry Radio Stores of Los Angeles, Evans Radio of Concord, and World Radio Laboratories of Council Bluffs for their cooperation in giving us the dealer prices on the used receivers. These prices will vary somewhat as a result of supply, demand and condition of a particular receiver, of course.

Collins 75A-1

1947-1950

Frequency Coverage: 80, 40, 20, 15, 11, and 10 meter amateur bands.
Specifications: 13 tubes plus rectifier; selectivity adjustable from .2 to 4 kc at 6 db down; sensitivity of 1 microvolt for 10 db S/N ratio.
Special Features: Dual conversion superhet with crystal controlled 1st oscillator and tunable 1st if; PTO oscillator-slug rack tuning of 1st if to provide direct reading calibration on all bands; variable selectivity crystal filter; noise limiter; S-Meter; amplified AVC; noise limiter and receive-standby switch.
Last Amateur Net Price: $375.00 including speaker.
Current Used Price: $240.00

Collins 75A-2

1950-1953
Frequency Coverage: 160, 80, 40, 20, 15, 11 and 10 meter amateur bands.
Specifications: 14 tubes plus rectifier; antenna input impedance of 50 to 150 ohms dependent on frequency, balanced or unbalanced input; selectivity of 2.4 kc at 6 db down and 10.5 kc at 60 db down in "broad" position; selectivity of .2 kc at 6 db down and 4.6 kc at 60 db down in "narrow" position.
Special Features: Dual conversion superhet with crystal controlled 1st oscillator and tunable 1st if; PTO oscillator-slug rack tuning of 1st if to provide direct reading calibration on all bands; variable selectivity crystal filter; noise limiter; antenna trimmer; S-Meter; amplified AVC; provisions for optional crystal calibrator and NBFM adaptor; front panel calibration corrector; receive-standby switch.
Last Amateur Net Price: $440.00
Current Used Price: $295.00

Collins 75A-4

1955-1959

Frequency Coverage: 160, 80, 40, 20, 15, 11 and 10 meter amateur bands.
Specifications: 20 tubes plus regulator and rectifier; sensitivity of 1.0 microvolt for 10 db S/N ratio at 3 kc; selectivity of 3.1 kc with mechanical filter supplied, optional 0.5, 1.5, 2.1, 4.0, and 6.0 kc available; calibration accuracy of 0.3 kc; image rejection of greater than 50 db; audio output of .15 watts into external 4 or 500 ohm loads.
Special Features: Dual conversion superhet with crystal controlled 1st oscillator and tunable 1st if; PTO unit and slug rack tuning used to provide direct reading calibration on all bands; passband tuning; Q-Multiplier; product detector for CW-SSB reception; crystal calibrator with front panel corrector; selectable AGC time constant; separate AGC if stage and detector; noise limiter antenna trimmer and S-Meter.
Dimensions: 17 1/4" x 10 1/2" x 15 1/2" deep.
Weight: 35 pounds.
Last Amateur Net Price: $790.00
Current Used Price: $495.00 and up.

Collins 75S-1

1958-Still Marketed

Frequency Coverage: Any 14, 200 kc bands between 3.4 and 30.0 mc. 12 crystals supplied cover 80, 40, 20, 15 and 28.5 to 28.7 portion of the 10 meter band, plus 15 mc WWV.
Specifications: 12 tubes plus selenium diode and 2 silicon rectifiers; 50 ohm antenna input; 2955 to 3155 tunable if, 455 kc fixed if; SSB selectivity is 2.1 kc at 6 db down, CW selectivity is 0.5 kc at 6 db down and am selectivity is 4.5 kc at 6 db down, 25 kc at 60 db down; sensitivity is 1 microvolt for 15 db signal to noise ratio for SSB operation; 4 ohm speaker output plus 500 ohm VOX output; draws 90 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Dual conversion superhet with crystal controlled 1st oscillator and bandpass 1st if; PTO 2nd oscillator; SSB filter supplied and if transformer selectivity used for am reception; optional CW and am filters are available. Filters are miniature Collins mechanical filters; product detector for CW/SSB reception; selectable sideband reception using crystal controlled BFO; S-Meter; muting and control system for integration with 32S-1 transmitter.
Dimensions: 6 7/8 x 14 1/2" x 11 5/8" deep.
Weight: 25 pounds.
Last Amateur Net Price: $525.00.
Current Used Price: $380.00 and up.

Drake 1-A

1957-1960

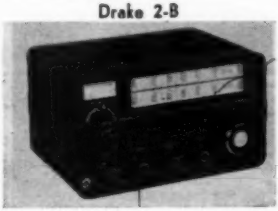
Frequency Coverage: (1) 3.5 to 4.1 mc. (2) 7.0 to 7.6 mc. (3) 14.0 to 14.6 mc. (4) 21.0 to 21.6 mc. (5) 28.0 to 28.6 mc. (6) 28.5 to 29.1 mc. (7) 29.1 to 29.7 mc. (8) WWV-10 mc.
Specifications: 12 tubes plus rectifier; 50-75 ohm antenna input; 2.9-3.5 mc tunable if, 50 and 1100 kc fixed if; sensitivity of less than 1 microvolt for 20 db S/N ratio; selectivity of 2.5 kc at 6 db down and 8.1 kc at 60 db down; draws 50 watts from 115 v, 60 cycle ac line.
Special Features: Internal PM speaker, triple conversion superhet with bandpass tuning, crystal controlled first oscillator, crystal calibrator, antenna attenuator, antenna trimmer, product detector for SSB, CW and AM reception, S-Meter, amplified AVC and muting terminals.
Dimensions: 6 3/4" x 11" x 15" deep.
Weight: 18 pounds.
Last Amateur Net Price: $299.95.
Current Used Price: $189.00.

Drake 2-A

1960-1961

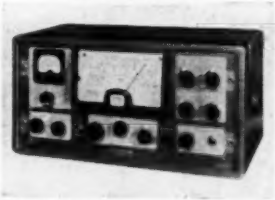
Frequency Coverage: Any 12, 600 kc bands between 3.5 and 30.0 mc with optional crystals. Crystals supplied for (1) 3.5 to 4.1 mc. (2) 6.9 to 7.5 mc. (3) 13.9 to 14.5 mc. (4) 20.9 to 21.5 mc. (5) 28.5 to 29.1 mc.
Specifications: 9 tubes plus rectifier and crystal diode; 50-75 ohm unbalanced antenna input; 3.5-4.1 mc tunable if, 50 and 455 kc fixed if; sensitivity of less than 0.5 microvolt for 10 db S/N ratio; selectivity of 2.4 kc at 6 db down and 8.5 kc at 60 db down or 4.8 kc at 6 db down and 23 kc at 60 db down; draws 40 watts from 120 v, 60 cycle ac line.
Special Features: Triple conversion superhet with adjustable bandwidth and bandpass tuning, crystal controlled first oscillator, optional crystal calibrator, selectable sideband product detector for SSB, CW and AM plus diode detector for CW and AM reception, S-Meter, amplified and delayed AVC, muting and VOX terminals.
Dimensions: 12" x 7" x 9" deep.
Weight: 14.5 pounds.
Last Amateur Net Price: $269.95.
Current Used Price: $210.00.

Drake 2-B



1961-Still Marketed
Frequency Coverage: Any 12, 600 kc bands between 3.5 and 30.0 mc with optional crystals. Crystals supplied for (1) 3.5 to 4.1 mc. (2) 6.9 to 7.5 mc. (3) 13.9 to 14.5 mc. (4) 20.9 to 21.5 mc. (5) 28.5 to 29.1 mc.
Specifications: 9 tubes plus rectifier; 50-75 ohm unbalanced antenna input; 3.5-4.1 mc tunable if, 50 and 455 kc fixed if; sensitivity of less than 0.5 microvolt for 10 db S/N ratio; selectivity of 0.5 kc at 6 db down and 2.75 kc at 60 db down, 2.1 kc at 6 db down and 7.5 kc at 60 db down or 3.6 kc at 6 db down and 10.5 kc at 60 db down; draws 40 watts from 120 v, 60 cycle ac line.
Special Features: Triple conversion superhet with adjustable bandwidth and bandpass tuning, crystal controlled first oscillator, optional crystal calibrator, selectable sideband product detector for SSB, CW and AM plus diode detector for CW and AM reception, S-Meter, noise limiter, amplified and delayed AVC with adjustable time constant, Q multiplier socket, muting and VOX terminals.
Accessories: Model 2-AQ Q-Multiplier and Deluxe Speaker. Model 2-AC Crystal Calibrator.
Dimensions: 12" x 7" x 9" deep.
Weight: 14.5 pounds.
Last Amateur Net Price: $279.95.
Current Used Price: 2-B Receiver $222.00

Geloso G-209-R



1959-Still Marketed

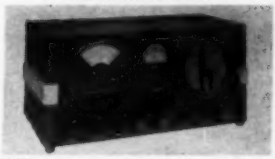
Frequency Coverage: Amateur bands, 80 through 10 meters plus 11 meter band.
Specifications: 12 tubes plus filament regulator, voltage regulator and semiconductor power supply; balanced or unbalanced antenna input; 467 and 4,600 kc if frequencies; 3.2 and 500 ohm audio output into external speaker; draws 90 watts from 110/125/140/160/220 v, 50/60 cycle ac line.
Special Features: Double conversion superhet; crystal filter; crystal controlled 2nd conversion oscillator with selectable sideband feature; separate product detector for CW/SSB reception; S-Meter; crystal calibrator; noise limiter; receive-standby switch.
Dimensions: 10" x 20" x 10 1/4" deep.
Last Amateur Net Price: $299.50
Current Used Price: $139.00

Hallicrafters S-20R

1939-1945

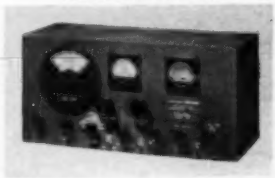
Frequency Coverage: .55 to 44.0 mc; (1) .55 to 1.78 mc. (2) 1.74 to 5.4 mc. (3) 5.3 to 15.8 mc. (4) 15.5 to 44.0 mc.
Specifications: 8 tubes plus rectifier; 400 ohms balanced or unbalanced antenna input; 455 kc if; draws 65 watts from 117v, 50/60 cycle ac line.
Special Features: Internal speaker, electrical bandspread, tone control, S-Meter receptacle, noise limiter and accessory receptacle.
Remarks: Available on surplus market following WW II.
Last Amateur Net Price: $60.00
Current Used Price: $25.00

Hallicrafters S-22R



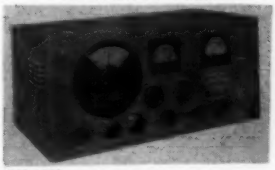
1940- ----
Frequency Coverage: 110 to 1500 kc and 1.7 to 18.0 mc; (1) 110 to 410 kc. (2) 400 to 1500 kc. (3) 1.7 to 5.9 mc. (4) 5.3 to 18.0 mc.
Specifications: 7 tubes plus rectifier; 400 ohms balanced or unbalanced antenna input; 1600 kc if; draws 50 watts from 110-125 v, 50/60 cycle ac line.
Special Features: Internal speaker, electrical bandspread and tone control.
Dimensions: 18 1/2" x 8 1/2" x 9 1/4" deep.
Remarks: Available on surplus market following WW II.
Last Amateur Net Price: $74.50.
Current Used Price: $27.50.

Hallicrafters SX-24



1939- ----
Frequency Coverage: .54 to 43.5 mc; (1) .54 to 1.73 mc. (2) 1.7 to 5.1 mc. (3) 5.0 to 15.7 mc. (4) 15.2 to 43.5 mc.
Specifications: 8 tubes plus rectifier; 400 ohms balanced or unbalanced antenna input; 455 kc if; 500 and 5000 ohm audio output to external speaker; draws 70 watts from 100-125 v, 60 cycle ac line.
Special Features: Calibrated electrical bandspread, crystal filter, tone control, S-Meter, noise limiter and accessory socket.
Last Amateur Net Price: $74.00.
Current Used Price: $49.00.

Hallicrafters SX-25



1940-1945

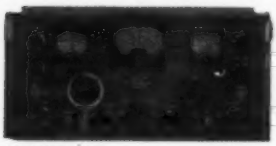
Frequency Coverage: .54 to 42.0 mc; (1) .54 to 1.7 mc. (2) 1.7 to 5.1 mc. (3) 5.0 to 15.7 mc. (4) 15.2 to 42.0 mc.
Specifications: 11 tubes plus rectifier; 400 ohm balanced or unbalanced antenna input; 455 kc if; 500 and 5000 ohm audio output to external speaker; draws 120 watts from 115 v, 60 cycle ac line.
Special Features: Calibrated electrical bandspread, crystal filter, tone control, S- Meter and noise limiter.
Remarks: Available on surplus market following WW II.
Last Amateur Net Price: $94.50.
Current Used Price: $55.00.

Hallicrafters S-27

1940-1942

Frequency Coverage: 27.5 to 145.0 mc; (1) 27.5 to 47.0 mc. (2) 46.0 to 82.0 mc. (3) 82.0 to 145.0 mc.
Power Consumption: Draws 115 watts from 115 v, 50/60 cycle ac line.
Remarks: See S-36 for further details. Available on surplus market following WW II.
Last Amateur Net Price: $195.00.
Current Used Price: $60.00.

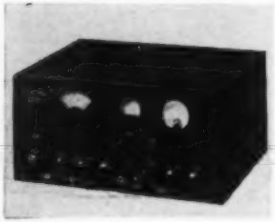
Hallicrafters SX-28 & A



1941-1944

Frequency Coverage: .55 to 43.0 mc; (1) .55 to 1.6 mc. (2) 1.6 to 3.0 mc. (3) 3.0 to 5.8 mc. (4) 5.8 to 11.0 mc. (5) 11.0 to 21.0 mc. (6) 21.0 to 43.0 mc.
Specifications: 14 tubes plus rectifier; 400 ohms balanced or unbalanced antenna input; 455 kc if; sensitivity of 6 to 20 microvolts over range of receiver for 500 mw audio output; selectivity of 12 kc at 2X down, 36 kc at 1000X down in broad position and 4.1 kc at 2X down, 22 kc at 1000X down in sharp position; audio power output of 8 watts into 500 or 5000 ohm load; draws 136 watts from 117 v, 60 cycle ac line.
Special Features: Calibrated electrical bandspread, crystal filter, phono input, tone control, S-Meter, noise limiter, antenna trimmer and external power supply receptacle.
Dimensions: 20 1/2" x 10" x 14 3/4" deep.
Weight: 75 pounds.
Remarks: SX-28A was government version using improved parts and layout. Both models were available on the surplus market following WW II.
Last Amateur Net Price:
SX-28.....$179.50.
SX-28A..... $223.00.
Current Used Price:
SX-28.....$75.00.
SX-28A..... $85.00.

Hallicrafters S-36



1942-1944

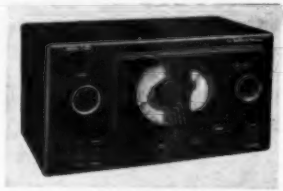
Frequency Coverage: 27.8 to 143 mc; (1) 27.8 to 47.0 mc. (2) 46.0 to 82.0 mc. (3) 82.0 to 143.0 mc.
Specifications: 13 tubes plus voltage regulator and rectifier; balanced or unbalanced antenna input; 5.25 mc if; sensitivity of 2 microvolts at 30 mc and 10 microvolts at 135 mc for 50 mw audio output; selectivity of not less than 10 kc or more than 25 kc in sharp position and not less than 65 kc,or more than 80 kc in broad position at 6 db down; audio output of 3 watts into 500 or 5000 ohm load; draws 115 watts from 115 or 230 v, 50/60 cycle ac line.
Special Features: AM and FM reception, adjustable selectivity, tone control, S-Meter, noise limiter, antenna trimmer and external power receptacle.
Remarks: Available on the surplus market following WW II.
Last Amateur Net Price: $307.50.
Current Used Price: $49.00.

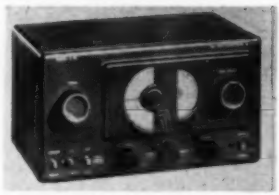
Hallicrafters S-37

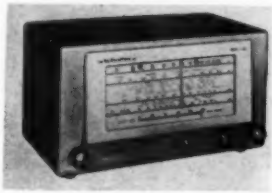
1942- ----

Frequency Coverage: 130.0 to 210.0 mc in one band.
Specifications: 12 tubes plus voltage regulator and rectifier; balanced or unbalanced antenna input; 16 mc if; 500 and 5000 ohm audio output; operated from internal ac power supply or external batteries.
Special Features: AM and FM reception, tone control, S-Meter, noise limiter, antenna trimmer and external power receptacle.
Remarks: Available on the surplus market following WW II.
Last Amateur Net Price: $591.75.
Current Used Price: $40.00.

Hallicrafters S-38 thru EM







1946-1959

Frequency Coverage: .55 to 31.0 mc; (1) .55 to 1.6 mc. (2) 1.6 to 5.0 mc. (3) 5.0 to 14.0 mc. (4) 13.0 to 31.0 mc.
Specifications: 4 or 5 tubes plus rectifier dependent on model; 52-600 ohm balanced or unbalanced antenna input; 455 kc if; draws 30 watts from 105-125 v dc or 50/60 cycle ac line.
Special Features: Internal speaker, electrical bandspread and, in some models, noise limiter.
Dimensions (Typical): 12 7/8" x 7" x 9" deep.
Weight (Typical): 12 pounds.
Remarks: Replaced S-19R Skybuddy. Data given is typical for the various models manufactured.
Last Amateur Net Price: $59.95.
Current Used Price: $32.50.

Hallicrafters S-40 thru BU

1946-1955

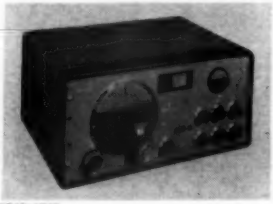
Frequency Coverage: .54 to 43.0 mc; (1) .54 to 1.7 mc. (2) 1.7 to 5.35 mc. (3) 5.35 to 15.7 mc. (4) 15.17 to 43.0 mc.
Specifications: 7 or 8 tubes plus rectifier dependent on model; 50-600 ohm balanced or unbalanced antenna input; 455 kc if; sensitivity of 15 microvolts at 550 kc and 8 microvolts at 40 mc for 500 mw audio output; selectivity of 6.8 kc at 6 db down and 40.7 kc at 60 db down; S-40, S-40A and S-40B draw 75 watts from 105-125 v, 50/60 cycle ac line; s-40AU and S-40BU draw 75 watts from 105-250 v, 25/60 cycle ac line.
Special Features: Internal 5" PM speaker, electrical bandspread, tone control, noise limiter and receptacle for external S-Meter.
Accessories: SM 40 S-Meter.
Remarks: Replaced S-20 Sky Champion. Data given is typical for the various models manufactured.
Last Amateur Net Price: $99.95.
Current Used Price: $60.00.

Hallicrafters S-41

946

Frequency Coverage: .55 to 30.0 mc in 3 bands.
Specifications: 5 tubes plus rectifier; 300 ohm balanced or unbalanced antenna input; 455 kc if; requires 105-125 v, 50/60 cycle ac power.
Special Features: Internal speaker, electrical bandspread and noise limiter.
Last Amateur Net Price: $36.75.
Current Used Price: $20.00.

Hallicrafters SX-42



1946-1949

Frequency Coverage: .54 to 110.0 mc; (1) .54 to 1.62 mc AM/CW. (2) 1.62 to 5.0 mc AM/CW. (3) 5.0 to 15.0 mc AM/CW. (4) 15.0 to 30.0 mc AM/CW. (5) 27.0 to 55.0 mc AM/CW/FM. (6) 55.0 to 110.0 mc AM/CW/FM.
Specifications: 13 tubes plus voltage regulator and rectifier; 300 ohm balanced or unbalanced antenna input; 455 kc AM if and 10.7 mc FM if; 500 or 5000 ohm audio output; draws 110 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Calibrated electrical bandspread, adjustable selectivity, crystal filter, FM/AM reception, tone control, S-

Meter, noise limiter and external power supply receptacle.
Remarks: Replaced SX-28. Standard rack mounting, cabinet supplied.
Last Amateur Net Price: $275.00.
Current Used Price: $140.00.

Hallicrafters SX-43

1947

Frequency Coverage: .54 to 55.0 mc and 86.0 to 109.0 mc; (1) .54 to 1.7 mc AM/CW. (2) 1.7 to 5.0 mc AM/CW. (3) 5.0 to 16.0 mc AM/CW. (4) 15.5 to 44.0 mc AM/CW. (5) 44.0 to 55.0 mc AM/CW/FM. (6) 86.0 to 109.0 mc AM/CW/FM.
Specifications: 10 tubes plus rectifier; 72-600 ohm balanced or unbalanced antenna input; 455 kc AM if and 10.7 mc FM if; 500 or 5000 ohm audio output; draws 90 watts from 105-125v, 50/60 cycle ac line.
Special Features: Calibrated electrical bandspread, adjustable selectivity, crystal filter, FM/AM reception, tone control, S-Meter, phono input, noise limiter and external power supply receptacle.
Last Amateur Net Price: $169.50.
Current Used Price: $100.00.

Hallicrafters S-51

1947

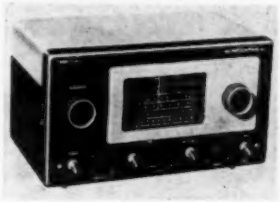
Frequency Coverage: 132 to 405 kc and .485 to 13 mc; (1) 132 to 405 kc. (2) .485 to 1.53 mc. (3) 1.45 to 4.55 mc. (4) 4.2 to 13.0 mc.
Specifications: 9 tubes plus rectifier; 300 ohm balanced or unbalanced antenna input; 455 kc if; draws 30 watts from 105-125 v, 50/60 cycle ac or dc line.
Special Features: Internal 5" PM speaker; 1 fixed tune channel in 200 to 300 kc range and 2 fixed tune channels in 2.0 to 3.0 mc range, tone control, noise limiter and provisions for internal vibrator power supplies. Accessories: 6, 12 and 32 volt vibrator power supplies.
Last Amateur Net Price: $200.00.
Current Used Price: $90.00.

Hallicrafters S-52

1948

Frequency Coverage: .54 to 44.0 mc; (1) .54 to 1.68 mc. (2) 1.68 to 5.4 mc. (3) 5.3 to 15.5 to 44.0 mc.
Specifications: 7 tubes plus rectifier; 50-600 ohm balanced or unbalanced antenna input; 455 kc if; draws 40 watts from 105-125 v, 50/60 cycle ac or dc line; provisions for operation from 220 v line with optional ballast resistor.
Special Features: Internal 5" PM speaker, electrical bandspread, tone control and noise limiter.
Last Amateur Net Price: $99.50.
Current Used Price: $40.00.

Hallicrafters S-53, A & U



S-53: 1948-1950. S-53A: 1950-1958. S-53U: 1948-1955.

Frequency Coverage: .55 to 1.65 mc, 2.6 to 31.0 mc and 48.0 to 55.0 mc; (1) .55 to 1.65mc. (2) 2.6 to 6.4 mc. (3) 6.2 to 16.5 mc. (4) 14.0 to 31.0 mc. (5) 48.0 to 55.0 mc.
Specifications: 7 tubes plus rectifier; 50-600 ohm balanced or unbalanced antenna input; 2.075 mc if; S-53 and S-53A draw 50 watts from 105-125 v, 50/60 cycle ac line; S-53U draws 50 watts from 105-250 v, 40 to 130 cycle ac line.
Special Features: Internal 5" PM speaker, electrical bandspread, tone control and noise limiter.
Last Amateur Net Price:
S-53.....$79.50.
S-53A.....$89.95.
S-53U.....$88.50.
Current Used Price: S-53.....$50.00.
S-53A.....$55.00.

Hallicrafters SX-62, A & U

SX-62: 1945-1948. SX-62A: 1955 -Still Marketed.

Frequency Coverage: .54 to 109 mc; (1) .54 to 1.62 mc AM/CW. (2) 1.62 to 4.9 mc AM/CW. (3) 4.9 to 15.0 mc AM/CW. (4) 15.0 to 32.0 mc AM/CW. (5) 27.0 to 56.0 mc AM/CW/FM. (6) 54.0 to 109.0 mc AM/CW/FM.
Specifications: 14 tubes plus voltage regulator and rectifier; 50-600 ohm balanced or unbalanced antenna input; 455 kc if from .54 to 32.0 mc and 10.7 mc if from 27.0 to 109.0 mc; 3.2, 8 or 500 ohm audio output; SX-62 and SX-62A draw 120 watts from 105-125 v, 50/60 cycle ac line; SX-62U draws 120 watts from 105-250 v, 25 to 100 cycle ac line.
Special Features: Crystal Filter, adjustable selectivity, FM/AM reception, tone control, "hi-fi" audio system with phono input, noise limiter, crystal calibrator with dial adjustment and provisions for external battery or vibrator power supply.
Dimensions: 20" x 10 1/2" x 16" deep.
Weight: 67 pounds.
Last Amateur Net Price:
SX-62.....$269.50.
SX-62A.....$395.00.
SX-62U.....$282.00.
Current Used Price:
SX-62.....$190.00.
SX-62A.....$210.00 and up.

Hallicrafters SX-71 & U

1950-1955

Frequency Coverage: .56 to 34.0 and 46.0 to 56.0 mc; (1) .56 to 1.6 mc. (2) 1.65 to 4.7 mc. (3) 4.7 to 13.4 mc. (4) 12.8 to 34.0 mc. (5) 46.0 to 56.0 mc.
Specifications: 11 tubes plus voltage regulator and rectifier; 50-600 ohm balanced or unbalanced antenna input; 455 kc and 2.075 mc if; 3.2 or 500 ohm audio output; SX-71 draws 90 watts from 105-125 v, 50/60 cycle ac line; SX-71U draws 90 watts from 105-250 v, 25 to 130 cycle ac line.
Special Features: Calibrated electrical bandspread, double conversion if system, crystal filter, AM, CW and NBFM detectors, phono input, noise limiter, tone control and accessory/external power supply socket.
Last Amateur Net Price: $199.50.
Current Used Price: $125.00.

Hallicrafters S-72 & L

1949-1955

Frequency Coverage: S-72: .55 to 30.0 mc; (1) .55 to 1.6 mc. (2) 1.5 to 4.4 mc. (3) 4.5 to 11.5 mc. (4) 11.0 to 30.0 mc.
S-72L: 180 to 400 kc and .55 to 11.5 mc; (1) 180 to 400 kc. (2) .55 to 1.6 mc. (3) 1.6 to 4.4 mc. (4) 4.5 to 11.0 mc.
Specifications: 8 tubes plus dry rectifier; self-contained loop antenna for band 1 of S-72 and bands 1 and 2 of S-72L, internal whip or external long wire antenna for other bands; 455 kc if; draws 25 watts from 105-125 v, 50/60 cycle ac or dc line or operates from self-contained dry batteries.
Special Features: Internal 5" PM speaker, electrical bandspread, noise limiter and portable case.
Last Amateur Net Price: $79.95.
Current Used Price: $44.00.

Hallicrafters SX-73

1952

Frequency Coverage: .54 to 54.0 mc; (1) .54 to 1.27 mc. (2) 1.27 to 3.0 mc. (3) 3.0 to 7.0 mc. (4) 7.0 to 13.8 mc. (5) 13.8 to 29.7 mc. (6) 29.7 to 54.0 mc.
Specifications: 17 tubes plus voltage regulator and rectifier; 50-200 ohm balanced or unbalanced antenna input; 455 kc and 6.0 mc if; sensitivity of less than 2 microvolts for 10 db S/N ratio; selectivity adjustable from 14.0 kc at 6 db down and 34.0 kc at 60 db down to .4 kc at 6 db down and 6.0 kc at 60 db down; 2 watts audio output into 500 ohm load for 2 microvolt rf input; draws 120 watts from 95/105/117/130/190/210/234/260 volt, 50/60 cycle ac line.
Special Features: Provision for 6 crystal controlled channels, provision for external BFO, if amplifier output jack, crystal filter, adjustable selectivity, dual conversion if system, noise limiter, antenna trimmer, S-Meter and audio amplifier input jack.
Dimensions: 19" x 10 15/32" x 18 1/2" deep.
Weight: 58 pounds.
Remarks: Military type R-274/FRR.
Last Amateur Net Price: $975.00.
Current Used Price: $400.00.

Hallicrafters S-76 & U

1950-1955
Frequency Coverage: .538 to 1.58 and 1.72 to 34.0 mc in 4 bands.
Specifications: 9 tubes plus voltage regulator and rectifier; 300 ohm balanced or unbalanced antenna input; 50 and 1650 kc if; 3.2 or 500 ohm audio output; S-76 draws 77 watts from 105-125 v, 50/60 cycle ac line; S-76U draws 77 watts from 115-250 v, 25 to 60 cycle ac line.
Special Features: Calibrated electrical bandspread, dual conversion if system, adjustable selectivity, S-Meter, tone control, noise limiter, phono jack and external power/accessory socket.
Dimensions: 18 1/2"x 8 7/8" x 9 1/2" deep.
Last Amateur Net Price: $149.95.
Current Used Price: $90.00.

Hallicrafters S-77 & A

1950-1955

Frequency Coverage: .54 to 44.0 mc; (1) .54 to 1.68 mc. (2) 1.68 to 5.4 mc. (3) 5.3 to 15.5 mc. (4) 15.5 to 44.0 mc.
Specifications: 7 tubes plus rectifier; 50-600 ohm balanced or unbalanced antenna input; 455 kc if; draws 40 watts from 105-125 v, 50/60 cycle ac or dc line.
Special Features: Internal speaker, electrical bandspread, noise limiter and tone control.
Accessories: Ballast tube for 210-250 v power line.
Last Amateur Net Price: $89.95.
Current Used Price: $55.00.

Hallicrafters S-85 & U

1955-1959

Frequency Coverage: .538 to 34.0 mc; (1) .538 to 1.6 mc. (2) 1.55 to 4.6 mc. (3) 4.6 to 13.0 mc. (4) 12.0 to 34.0 mc.
Specifications: 7 tubes plus rectifier; 52-600 ohm balanced or unbalanced antenna input; 455 kc if; S-85 draws 75 watts from 105-125 v, 50/60 cycle ac line; s-85U draws 75 watts from 100-250 v, 25 to 60 cycle ac line.
Special Features: Calibrated electrical bandspread, internal 5" PM speaker, noise limiter and tone control.
Dimensions: 18 1/2" x 9" x 10 5/8" deep.
Weight: 27 1/2 pounds.
Remarks: Replaced S-40B.
Last Amateur Net Price: $119.95.
Current Used Price: $82.00.

Hallicrafters S-86

1955-1959

Frequency Coverage: .538 to 34.0 mc; (1) .538 to 1.6 mc. (2) 1.55 to 4.6 mc. (3) 4.6 to 13.0 mc. (4) 12.0 to 34.0 mc.
Specifications: 7 tubes plus rectifier; 52-600 ohm balanced or unbalanced antenna input; 455 kc if; draws 40 watts from 105-125 v, 50/60 cycle ac or dc line.
Special Features: Internal 5" PM speaker, calibrated electrical bandspread, tone control and noise limiter.
Dimensions: 18 1/2" x 9" x 10 5/8" deep.
Remarks: Replaced S-77A.
Last Amateur Net Price: $119.95.
Current Used Price: $78.00.

Hallicrafters SX-88 & U

1954-1955

Frequency Coverage: .535 to 33.0 mc; (1) .535 to 1.7 mc. (2) 1.69 to 3.0 mc. (3) 2.98 to 5.5 mc. (4) 5.4 to 10.0 mc. (5) 9.8 to 18.3 mc. (6) 17.8 to 33.0 mc.
Specifications: 17 tubes plus current regulator, voltage regulator and rectifier; 50-600 ohm balanced or unbalanced antenna input; 50 and 1550 kc if on band 2, 50 and 2075 kc if on all other bands; sensitivity of 1.0 to 1.5 microvolts for .5 watts audio output and 1.5 to 2.0 microvolts for 10 db S/N ratio on all except broadcast band; selectivity adjustable between .25 and 10 kc at 6 db down and 1.0 to 24.0 kc at 60 db down; 10 watts audio output into 3.2, 8 or 500 ohm load; SX-88 draws 138 watts from 105-125 v, 50/60 cycle ac line; SX-88U draws 138 watts from 100-250 v, 25 to 60 cycle ac line.
Special Features: Calibrated electrical bandspread, dual conversion if system, adjustable selectivity, crystal calibrator, antenna trimmer, amplified and delayed AVC, phono input jack, IF output jack, tone control, S-Meter, noise limiter and accessory/external power socket.
Dimensions: 19" x 8 3/4" rack panel, cabinet supplied.
Last Amateur Net Price: $595.00.
Current Used Price: $310.00.

Hallicrafters S-96

1955-1956

Frequency Coverage: .538 to 1.58 mc and 1.72 to 34.0 mc; (1) .538 to 1.58 mc. (2) 1.72 to 4.9 mc. (3) 4.6 to 13.0 mc. (4) 12.0 to 34.0 mc.
Specifications: 10 tubes plus voltage regulator and rectifier; 300 ohm balanced or unbalanced antenna input; 50.5 and 1650 if; selectivity adjustable between .5 and 5.0 kc at 6 db down and 5.0 and 20.0 kc at 60 db down; 3.2 or 500 ohm audio output; draws 80 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Calibrated electrical bandspread, dual conversion if system with selectable sideband, phono input jack, S-Meter, noise limiter, tone control and accessory/external power socket.
Dimensions: 18 1/2" x 8 7/8" x 11" deep.
Weight: 34 1/2 pounds.
Last Amateur Net Price: $249.95.
Current Used Price: $169.00.

Hallicrafters SX-99 & U

1955-1959

Frequency Coverage: .538 to 34.0 mc; (1) .538 to 1.6 mc. (2) 1.55 to 4.6 mc. (3) 4.6 to 13.0 mc. (4) 12.0 to 34.0 mc.
Specifications: 7 tubes plus rectifier; 52-600 ohm antenna input; 455 kc if; 3.2 or 500 ohm audio output; SX-99 draws 75 watts from 105-125 v, 50/60 cycle ac line; SX-99U draws 75 watts from 100-250 v, 25 to 60 cycle ac line.
Special Features: Calibrated electrical bandspread, antenna trimmer, crystal filter, S-Meter, noise limiter and tone control.
Dimensions: 18 3/4" x 9" x 10 3/4" deep.
Weight: 28 1/4 pounds.
Last Amateur Net Price: $149.95.
Current Used Price: $109.00.

Hallicrafters SX-100

1956-Still Marketed

Frequency Coverage: .538 to 34.0 mc; (1) .538 to 1.58 mc. (2) 1.72 to 4.9 mc. (3) 4.6 to 13.0 mc. (4) 12.0 to 34.0 mc.
Specifications: 12 tubes plus voltage regulator and rectifier; 300 ohms balanced or unbalanced antenna input; 50.5 and 1650 kc if; adjustable selectivity of from 0.5 to 5.0 kc at 6 db down and from 5.0 to 20.0 kc at 60 db down; 3.2 or 500 ohm audio output; draws 88 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Calibrated electrical bandspread, dual conversion if system with selectable sideband, adjustable selectivity, antenna trimmer, notch filter, crystal calibrator, SSB AVC time constant, S-Meter, phono input jack, noise limiter and accessory /external power supply jack.
Dimensions: 18 1/2" x 8 7/8" x 11" deep.
Weight: 34 1/2 pounds.
Last Amateur Net Price: $325.00.
Current Used Price: $200.00.

Hallicrafters SX-101 & A

SX-101: 1957-1958. Sx-101A: 1959-Still Marketed.
Frequency Coverage: (1) 3.5 to 4.0 mc. (2) 7.0 to 7.3 mc. (3) 14.0 to 14.4 mc. (4) 21.0 to 21.5 mc. (5) 28.0 to 30.0 mc. (6) 10.0 mc WWV. (7) 2 & 6M converter input, 30.5 to 34.5 mc.
Specifications: 13 tubes plus voltage regulator and rectifier; 50-70 ohm balanced or unbalanced antenna input; 50.75 and 1650 kc if; sensitivity of 1 microvolt for 10 db S/N ratio except for converter band which is 4 microvolts; selectivity of .5, 1, 2, 3 and 5 kc at 6 db down; 3.2 or 500 ohm audio output; draws 115 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Dual conversion if system with selectable sideband, product detector for CW/SSB reception, notch filter, crystal calibrator, adjustable AVC time constant, tone control, S-Meter, antenna trimmer, noise limiter, internal heating element and accessory socket.
Dimensions: 20" x 10 1/2" x 16" deep.
Weight: 70 pounds.
Remarks: SX-101 had 160M coverage with no VHF converter input.
Last Amateur Net Price: SX-101.....$395.
SX-101A... $445.
Current Used Price: SX-101.....$239.
SX-101A.....279.00 and up.

Hallicrafters S-102

1956-1957

Frequency Coverage: 143 to 149 mc.
Specifications: 7 tubes plus selenium rectifier; 300 ohm balanced or unbalanced antenna input; 10.7 mc if; draws 40 watts from 105-125 v, 50/60 cycle ac or dc line.
Special Features: Internal 5" PM speaker, standby switch with external contacts and noise limiter.
Dimensions: 13" x 7 1/2" x 8 3/4" deep.
Weight: 13 pounds.
Last Amateur Net Price: $59.95.
Current Used Price: $37.50.

Hallicrafters S-106

1956-1957

Frequency: 50.0 to 54.0 mc.
Specifications: 7 tubes plus selenium rectifier; 300 ohm balanced or unbalanced antenna input; 10.7 mc if; draws 40 watts from 105-125 v, 50/60 cycle ac or dc line.
Special Features: Internal 5" PM speaker, standby switch with external contacts and noise limiter.
Dimensions: 13" x 7 1/2" x 8 3/4" deep.
Weight: 10 5/8 pounds.
Last Amateur Net Price: $59.95.
Current Used Price: $35.00.

Hallicrafters S-107

1958

Frequency Coverage: .54 to 1.63, 2.51 to 31.0 and 48.0 to 54.0 mc; (1) .54 to 1.63 mc. (2) 2.5 to 6.3 mc. (3) 6.3 to 16.0 mc. (4) 14.0 to 31.0 mc. (5) 48.0 to 54.5 mc.
Specifications: 7 tubes plus rectifier; 52-600 ohm balanced or unbalanced antenna input; 455 kc if; draws 50 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Internal 4" x 6" speaker, electrical bandspread, noise limiter and external audio amplifier jack.
Remarks: Replaced S-53.
Last Amateur Net Price: $94.95.
Current Used Price: $72.00.

Hallicrafters S-108

1959-Still Marketed.

Frequency Coverage: .538 to 34.0 mc; (1) .538 to 1.6 mc. (2) 1.55 to 4.6 mc. (3) 4.6 to 13.0 mc. 12.0 to 34.0 mc.
Specifications: 7 tubes plus rectifier; 52-600 ohm balanced or unbalanced antenna input; 455 kc if; draws 75 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Internal 5" PM speaker, calibrated electrical bandspread, noise limiter and tone control.
Dimensions: 18 3/4" x 8" x 10 1/4" deep.
Weight: 28 1/4 pounds.
Last Amateur Net Price: $139.95.
Current Used Price: $109.00.

Hallicrafters SX-110

1959-Still Marketed.

Frequency Coverage: .538 to 34.0 mc; (1) .538 to 1.6 mc. (2) 1.55 to 4.6 mc. (3) 4.6 to 13.0 mc. (4) 12.0 to 34.0 mc.
Specifications: 7 tubes plus rectifier; 52-600 ohm balanced or unbalanced antenna input; 455 kc if; 3.2 or 500 ohm audio output; draws 75 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Calibrated electrical bandspread, crystal filter, S-Meter, tone control, noise limiter and antenna trimmer.
Dimensions: 18 3/4" x 8" x 10 1/4" deep.
Weight: 28 1/4 pounds.
Remarks: refined version of S-108, less speaker.
Last Amateur Net Price: $169.95.
Current Used Price: $125.00.

Hallicrafters SX-111

1959-Still Marketed.
Frequency Coverage: (1) 3.5 to 4.0 mc. (2) 7.0 to 7.3 mc. (3) 14.0 to 14.4 mc. (4) 21.0 to 21.5 mc. (5) 28.0 to 29.7 mc. (6) 10.0 mc WWV.
Specifications: 12 tubes plus voltage regulator and rectifier; 50-70 ohms unbalanced antenna input; 50.75 and 1650 kc if; sensitivity of less than 1.0 microvolt for 10 db S/N ratio; adjustable selectivity of from 0.5 to 5.0 kc at 6 db down; 3.2 or 500 ohm audio output; draws 83 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Dual conversion if system with selectable sideband, product detector for CW/SSB reception, notch filter, calibration oscillator, antenna trimmer, voltage regulated oscillator supply, S-Meter, noise limiter and receiving muting terminals.
Dimensions: 18 11/16" x 8 13/16" x 10 3/16" deep.
Weight: 35 3/4 pounds.
Last Amateur Net Price: $279.50.
Current Used Price: $200.00.

Hallicrafters SX-115

1961-Still Marketed.

Frequency Coverage: (1) 3.5 to 4.0 mc. (2) 7.0 to 7.5 mc. (3) 9.6 to 10.1 mc, uncalibrated. (4) 14.0 to 14.5 mc. (5) 21.0 to 21.5 mc. (6) 28.0 to 28.5 mc. (7) 28.5 to 29.0 mc. (8) 29.5 to 30.0 mc.
Specifications: 17 tubes plus voltage regulator and 5 silicon diodes; 50-70 ohm unbalanced antenna input; 50.75 and 1005 kc fixed and 6.505 to 6.005 mc variable if; sensitivity on AM of 1.0 microvolt for 10 db S/N ratio; sensitivity on SSB/CW of less than 0.5 microvolt; selectivity variable in 5 steps from .5 to 5 kc at 6 db down; audio output of 1.5 watts into 3.2 or 500 ohm load; draws 85 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Triple conversion if system with selectable sideband, product detector for CW/SSB reception, crystal controlled 1st and 3rd conversion oscillators, crystal calibrator, if-type noise limiter for CW/SSB and series type noise limiter for AM reception, amplified dual loop AVC with fast attack and slow release time constant, internal heating element, band gain equalization, inverse feedback audio system, antenna trimmer, S-Meter and accessory socket.
Dimensions: 16" x 10 1/2" x 16" deep.
Weight: 44 pounds.
Last Amateur Net Price: $595.00.
Current Used Price: $480.00.

Hallicrafters S-118

1961-Still Marketed.

Frequency Coverage: 185 to 420 kc and .495 to 31.0 mc; (1) 185 to 420 kc. (2) .490 to 1.62 mc. (3) 1.6 to 4.95 mc. (4) 4.85 to 15.0 mc. (5) 14.8 to 31.0 mc.

Specifications: 5 tubes plus 2 silicon rectifiers; loopstick plus external antenna on bands 1 and 2; 50-75 ohm balanced or unbalanced antenna input for all other bands; 455 kc if; operates from 115 v, 50/60 cycle ac line.
Special Features: Internal speaker, electrical bandspread, phono input and audio output jacks, noise limiter and accessory/external power supply socket.
Dimensions: 14 1/2" x 5 11/16" x 8 1/2" deep.
Shipping Weight: 19 pounds.
Last Amateur Net Price: $99.95.
Current Used Price: Not priced.

Hallicrafters S-119 & K

1961-Still Marketed.

Frequency Coverage: (1) .535 to 1.64 mc. (2) 2.0 to 5.5 mc. (3) 5.7 to 16.4 mc.
Specifications: 3 tubes plus 1 diode and selenium rectifier; ferrite rod antenna for band 1 and unbalanced antenna input for all other bands; 455 kc if; draws 16 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Internal PM speaker.
Dimensions: 10 1/2" x 5" x 7 1/2" deep.
Weight: 7 1/2 pounds.
Remarks: Available wired and tested or in kit form.
Last Amateur Net Price:
S-119 Wired Receiver.....$49.95.
S-119K Kit receiver.....$39.95.
Current Used Price: $35.00.

Hallicrafters S-120

1960-Still Marketed.

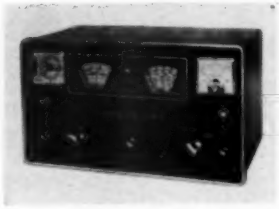
Frequency Coverage: .54 to 31.0 mc; (1) .54 to 1.55 mc. (2) 1.55 to 4.4 mc. (3) 4.4 to 11.0 mc. (4) 11.0 to 31.0 mc.
Specifications: 4 tubes plus rectifier; 50-600 ohm unbalanced antenna input plus loopstick on band 1 and 45" collapsable whip on all other bands; 455 kc if; draws 30 watts from 105-125 v, 50/60 cycle ac or dc line.
Special Features: Internal 5" PM speaker and electrical bandspread.
Dimensions: 13 1/2" x 5 7/8" x 8 3/4" deep.
Weight: 10 1/4 pounds.
Last Amateur Net Price: $69.95.
Current Used Price: $50.00.

Hallicrafters SX-140 & K

1961-Still Marketed.

Frequency Coverage: (1) 3.5 to 4.0 mc. (2) 7.0 to 7.3 mc. (3) 14.0 to 14.4 mc. (4) 21.0 to 21.5 mc. (5) 28.0 to 29.9 mc. (6) 50.0 to 50.4 mc.
Specifications: 5 tubes plus 2 silicon diodes; 50-75 ohm unbalanced antenna input; 1650 kc if; 3.2 ohm audio output; draws 47 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Antenna trimmer, amplified S-Meter, calibration oscillator, regenerative if system and auxilliary switching terminals.
Dimensions: 13 3/8" x 7 3/16" x 8 1/4" deep.
Weight: 13 1/2 pounds.
Remarks: Available wired and tested or in kit form.
Last Amateur Net Price:
SX-140 Wired Receiver.....$124.95.
SX-140K Kit Receiver.....$104.95.
Current Used Price: $92.00.

Hammarlund HQ-100A



1961-Still Marketed.
Frequency Coverage: .54 to 30.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.0 mc. (3) 4.0 to 10.0 mc. (4) 10.0 to 30.0 mc.
Specifications: 8 tubes plus regulator and rectifier; 50-600 ohm balanced or unbalanced antenna input; 3.2 ohm audio output to external speaker; 455 kc if; selectivity of 6.0 kc at 6 db down and 30 kc at 60 db down with Q-Multiplier off; operates from 105-125 v, 60 cycle ac line.
Special Features: Calibrated electrical bandspread; Telechron clock timer in "AC" model; variable response audio system; antenna trimmer; Q-Multiplier; noise limiter; S-Meter and receive-standby switch.
Accessories:
S-100 Speaker.
XC-100 Crystal Calibrator.
Dimensions: 9 7/16" x 16 1/4" x 9 1/8" deep.
Shipping Weight: 33 pounds.
Last Amateur Net Price:
HQ-100A Receiver.....$189.00.
HQ-100AC Receiver.....$199.00.
S-100 Speaker.....$14.95.
XC-100 Crystal Calibrator.....$15.95.
Current Used Price:
HQ-100A Receiver.....$145.00.
HQ-100AC Receiver.....$150.00.
S-100 Speaker.....$10.00.

Hammarlund HQ-100 & C

1956-1961

Frequency Coverage: .54 to 30.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4 mc. (3) 4.0 to 10.0 mc. (4) 10.0 to 30.0 mc.

Specifications: 8 tubes plus regulator and rectifier; 50-600 ohm balanced or unbalanced antenna input; 455 kc if; selectivity of 6.0 kc at 6 db down and 30 kc at 60 db down with Q-Multiplier off; 3.2 ohm audio output to external speaker; operates from 105-125 v, 60 cycle ac line.
Special features: Calibrated electrical bandspread; Telechron clock timer in "C" model; variable response audio system; antenna trimmer; Q-Multiplier; noise limiter; S-Meter and receive-standby switch.
Accessories: S-100 Speaker.
XC-455 Crystal Controlled BFO.
Dimensions: 9 7/16" x 16 1/4" x 9 1/8" deep.
Shipping Weight: 31 pounds.
Last Amateur Net Price:
HQ-100 Receiver.....$189.00.
HQ-100C Receiver.....$199.00.
S-100 Speaker.....$14.95.
XC-455 Crystal Controlled BFO....$15.95.
Current Used Price:
HQ-100 Receiver.....$130.00.
HQ-100C Receiver.....$135.00.
S-100 Speaker.....$10.00.

Hammarlund HQ-110 & A

HQ-110: 1958-1962.
HQ-110A: 1962-Still Marketed.

NOTE: The later model HQ-110A contained minor mechanical and electrical improvements, accessory socket for preamp or converter applications, 2 meter dial calibration for use with external converter and separate 6 meter antenna input. These changes do not warrant separate description.
Frequency Coverage: (1) 1.8 to 2.0 mc. (2) 3.5 to 4.0 mc. (3) 7.0 to 7.3 mc. (4) 14.0 to 14.4 mc. (5) 21.0 to 21.6 mc. (6) 28.0 to 30.0 mc. (7) 50.0 to 50.4 mc.
Specifications: 10 tubes plus regulator and rectifier; 455 and 3045 kc if frequencies; sensitivity of 1.5 microvolts for 10 db S/N ratio; selectivity of 9.7 kc at 6 db down with Q-Multiplier off; 1 watt audio output into 3.2 ohm external speaker; draws 80 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Dual conversion superhet on frequencies above 7.0 mc; crystal controlled 2nd conversion oscillator; crystal calibrator with front panel corrector; Q-Multiplier; separate product detector for CW/SSB reception; variable response audio system; antenna trimmer; noise limiter; optional Telechron timer; S-Meter; receive-standby switch.
Accessories: S-100 Speaker.
Dimensions: 9 7/8" x 16 1/4" x 9 1/8" deep.
Shipping Weight: 30 pounds.
Last Amateur Net Price:
HQ-110 Receiver.....$249.00.
HQ-110C Receiver with Telechron timer $259.00.
HQ-110A Receiver.....$249.00.
HQ-100A Rcvr. with Telechon timer $259.00.
Current Used Price:
HQ-100 Receiver .....$190.00.

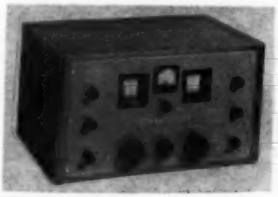
HQ-110C Receiver .....$195.00.
HQ-110A Receiver.....$200.00.
HQ-110A Receiver with Telechron timer $205.00.

Hammarlund HQ-129X

1946-1950

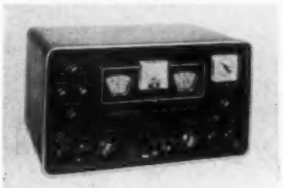
Frequency Coverage: .54 to 31.0 mc; (1) .54 to 1.32 mc. (2) 1.32 to 3.2 mc. (3) 3.2 to 5.7 mc. (4) 5.7 to 10.0 mc. (5) 10.0 to 18.0 mc. (6) 18.0 to 31.0 mc.
Specifications: 9 tubes plus regulator and rectifier; balanced or unbalanced antenna input; 455 kc if; adjustable selectivity from less than 1.0 to 10.0 kc at 6 db down; audio output of 3 watts into external 6 ohm load; operates from 105-125 v, 50/60 cycle ac line.
Special Features: Calibrated electrical bandspread; crystal filter with adjustable selectivity; noise limiter; S-Meter; antenna trimmer and receive-standby switch.
Last Amateur Net Price: $177.30.
Current Used Price: $129.00.

Hammarlund HQ-140X & XA



HQ-140X: 1953-1955.
HQ-140XA: 1955-1958.
NOTE: The later model HQ-140XA contained minor mechanical and electrical improvements. These changes do not warrant separate description.
Frequency Coverage: .54 to 31.0 mc; (1) .54 to 1.32 mc. (2) 1.32 to 3.2 mc. (3) 3.2 to 5.7 mc. (4) 5.7 to 10.0 mc. (5) 10.0 to 18.0 mc. (6) 18.0 to 31.0 mc.
Specifications: 9 tubes plus regulator and rectifier; antenna input of 100 ohms, balanced or unbalanced; 455 kc if; 2 watts audio output into external 6 ohm speaker; operates from 105-125 v, 50/60 cycle ac supply.
Special Features: Calibrated electrical bandspread; crystal filter with adjustable selectivity; S-Meter; noise limiter; antenna trimmer and receive standby switch.
Accessories: XC-100 Crystal Calibrator.
Last Amateur Net Price:
HQ-140X.....$264.50.
HQ-140XA.....$249.00.
Current Used Price:
HQ-140X.....$155.00.
HQ-140XA.....$165.00.

Hammarlund HQ-145, C & X



HQ-145: 1958-1961
HQ-145X: 1961-Still Marketed
NOTE: The HQ-145X model includes provisions for 1 crystal controlled channel within the tuning range of the receiver.
Frequency Coverage: .54 to 30.0 mc. (1) .54 to 1.6 mc. (2) 1.6 to 4.0 mc. (3) 4.0 to 10.0 mc. (4) 10.0 to 30.0 mc.
Specifications: 9 tubes plus regulator and rectifier; balanced or unbalanced antenna input; 455 and 3035 kc if; sensitivity of 1.75 microvolts for 10 db S/N ratio; selectivity adjustable from between .5 and 10 kc at 6 db down; audio output of 1 watt into external 3.2 ohm speaker, operates from 105-125 v, 50/60 cycle ac line.
Special Features: Double conversion superhet above 10.0 mc; crystal filter with adjustable selectivity; crystal controlled 1st conversion oscillator; notch filter; S-Meter; noise limiter; variable response audio system; calibrated electrical bandspread; Telechron clock timer optional in "C" model; receive-standby switch.
Accessories: S-200 Speaker.
XC-100P Crystal Calibrator.
Dimensions: 10 1/2"x 19" x 13" deep.
Shipping Weight: 42 pounds.
Last Amateur Net Price:
HQ-145 Receiver.....$269.00.
HQ-145C Receiver with Telechron Timer $279.00.
HQ-145X Receiver..... $269.00.
S-200 Speaker.....$19.95.
XC-100P Xtal Calibrator.....$15.95.
Current Used Price:
HQ-145 Receiver.....$198.00.
HQ-145C Receiver.....$202.00.
HQ-145X Receiver.....$205.00.
S-200 Speaker.....$10.00.

Hammarlund HQ-150

1955-1958

Frequency Coverage: .54 to 31.0 mc; (1) .54 to 1.32 mc. (2) 1.32 to 3.2 mc. (3) 3.2 to 5.7 mc. (4) 5.7 to 10.0 mc. (5) 10.0 to 18.0 mc. (6) 18.0 to 31.0 mc.
Specifications: 11 tubes plus regulator and rectifier; 50-300 ohm, balanced or unbalanced antenna input; 455 kc if; audio output of 2 watts into external 8 ohm speaker; operates from 105-125 v, 50/60 cycle ac line.
Special Features: Calibrated electrical bandspread; crystal filter; Q-Multiplier; crystal calibrator; S-Meter; noise limiter and receive-standby switch.
Last Amateur Net Price: $294.00.
Current Used Price: $189.00.

Hammarlund HQ-160

1958-1960

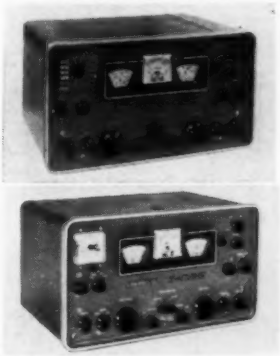
Frequency Coverage: .54 to 31.0 mc; (1) .54 to 1.32 mc. (2) 1.32 to 3.2 mc. (3) 3.2 to 5.7 mc. (4) 5.7 to 10.0 mc. (5) 10.0 to 18.0 mc. (6) 18.0 to 31.0 mc.
Specifications: 11 tubes plus regulator and rectifier; 75 ohm, balanced or unbalanced, antenna input; 455 and 3035 kc if; selectivity of 3.7 kc at 6 db down with Q-Multiplier off; audio output of 1 watt into external 3.2 ohm speaker; draws 100 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Calibrated electrical bandspread; double conversion superhet above 10.0 mc; notch filter; Q-Multiplier; product detector for CW/SSB reception; if output jack; crystal controlled 1st conversion oscillator; crystal calibrator with front panel corrector; antenna trimmer; S-Meter; noise limiter and receive-standby switch.
Last Amateur Net Price: $379.00.
Current Used Price: $265.00.

Hammarlund HQ-170

1958-Still Marketed

Frequency Coverage: (1) 1.8 to 2.0 mc. (2) 3.5 to 4.0 mc. (3) 7.0 to 7.3 mc. (4) 14.0 to 14.4 mc; (5) 21.0 to 21.6 mc. (6) 28.0 to 30.0 mc. (7) 50.0 to 54.0 mc.
Specifications: 15 tubes plus regulator and rectifier; 100 ohm balanced or unbalanced antenna input; if frequencies of 60, 455 and 3035 kc; 1 watt audio output into external 3.2 ohm speaker; sensitivity of 1.5 microvolt for 10 db S/N ratio; selectivity adjustable from .5 to 6.0 kc; draws 120 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Double conversion superhet on 160 and 80 meters, triple conversion on all other bands; adjustable selectivity with selectable sideband; vernier tuning; separate product detector for CW/SSB reception; S-Meter with amplifier stage; delayed AGC with adjustable time constant; slot filter; crystal calibrator with front panel corrector; antenna trimmer; variable response audio system; receive-standby switch with muting provisions.
Accessories: S-200 Speaker.
Dimensions: 10 1/2" x 19" x 13" deep.
Shipping Weight: 45 pounds.
Last Amateur Net Price:
HQ-170 Receiver.....$359.00.
HQ-170C Receiver with Telechron timer $369.00.
S-200 Speaker.....$ 19.95.
Current Used Price:
HQ-170 Receiver.....$265.00.
HQ-170C Receiver.....$275.00.
S-200 Speaker..... $ 10.00.

Hammarlund HQ-180



1960-Still Marketed

Frequency Coverage: .54 to 30 mc in 6 bands; bandspread calibration on 80, 40, 20, 15 and 10 meter amateur bands.
Specifications: 16 tubes plus regulator and rectifier; 72 ohm balanced or unbalanced antenna input; if frequencies of 60, 455 and 3035 kc; sensitivity of 1.5 microvolts for 10 db S/N ratio; selectivity of 1, 2 and 3 kc in LSB abd USB positions and 5, 2, 4 and 6 kc in BOTH position; audio output of 1 watt into external 3.2 ohm speaker; operates from 105-125 v, 50/60 cycle ac line.
Special Features: Double conversion superhet from .54 to 7.8 mc and triple conversion superhet from 7.8 to 30.0 mc; if system combines high frequency crystal filter and 60 kc LC filter to provide adjustable selectivity and selectable sideband reception; separate product detector for CW/SSB recept-

lan; crystal controlled first converter oscillator; delayed AGC; S-Meter with amplifier stage; slot filter; crystal calibrator with front panel corrector; adjustable noise limiter; antenna trimmer; adjustable AGC; variable response audio system; receive-standby switch with muting provisions.
Accessories: S-200 Speaker.
Dimensions: 10 1/2" x 19" x 13" deep.
Shipping Weight: 45 pounds.
Last Amateur Net Price:
HQ-180 Receiver.....$429.00.
HQ-180 Receiver with Telechron timer $439.00.
S-200 Speaker.....$ 19.95.
Current Used Price:
HQ-180 Receiver.....$325.00.
HQ-180C Receiver.....$330.00.

Hammarlund PRO-310

1955-?

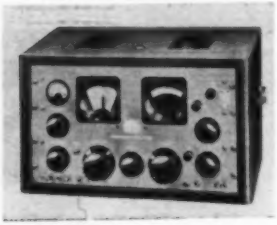
Frequency Coverage: .55 to 35.52 mc; (1) .55 to 1.11 mc. (2) 1.10 to 2.22 mc. (3) 2.20 to 4.44 mc. (4) 4.40 to 8.88 mc. (5) 8.80 to 17.76 mc. (6) 17.60 to 35.52 mc.
Specifications: 10 tubes plus regulator and 2 rectifiers; 52 and 1602 kc if frequencies; adjustable selectivity ranging from .3 kc to 4.0 kc at 6 db down to 3.8 to 13.2 kc at 60 db down.
Special Features: Differential tuning bandspread system; noise limiter; S-Meter; dual conversion above 2.2 mc; antenna trimmer; BFO buffer stage; provisions for optional crystal calibrator and receive standby switch.
Dimensions: 9" x 17 7/8" x 15 1/2" deep.
Weight: 65 pounds.
Last Amateur Net Price: $595.00.
Current Used Price: $275.00.

Hammarlund SP-400X & SX

1945-1950

Frequency Coverage:
SP-400-X..... .54 to 30 mc; (1) .54 to 1.24 mc. (2) 1.24 to 2.86 mc. (3) 2.85 to 6.3 mc. (4) 6.3 to 14.0 mc. (5) 13.4 to 30.0 mc.
SP-400-SX.....1.25 to 40.0 mc; (1) 1.25 to 2.5 mc. (2) 2.5 to 5.0 mc. (3) 5.0 to 10.0 mc. (4) 10.0 to 20.0 mc. (5) 20.0 to 40.0 mc.
Specifications: 16 tubes plus 2 rectifiers; antenna input of 100 ohms balanced or unbalanced; 455 kc if; 500 ohm audio output to external speaker; draws 180 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Electrical bandspread; external power supply; S-Meter; noise limiter; crystal filter with adjustable selectivity; adjustable if selectivity; antenna trimmer; phono input; receive-standby switch.
Last Amateur Net Price: $450.00.
Current Used Price: $155.00.

Hammarlund SP-600-JX



1950-Still Marketed

Frequency Coverage: .54 to 54.0 mc; (1) .54 to 1.35 mc. (2) 1.35 to 3.45 mc. (3) 3.45 to 7.4 mc. (4) 7.4 to 14.8 mc. (5) 14.8 to 29.7 mc. (6) 29.7 to 54.0 mc.
Specifications: 18 tubes plus regulator and rectifier; 100 ohm balanced antenna input; 455 and 3955 kc if frequencies; sensitivity of better than 2.5 microvolts for 10 db S/N ratio; image rejection of better than 80 db; 2.5 watts audio output into external 600 ohm load; draws 120 watts from 95/105/117/130 190/210/234/260 v, 50/60 cycle ac line.
Special Features: Double conversion superhet above 7.4 mc; crystal controlled 2nd conversion oscillator; variable and crystal controlled first conversion oscillators with provisions for 6 crystals; crystal filter with adjustable bandwidth of .2, .5, 1.3, 6.0, and 13.0 kc at 6 db down; S-Meter with spring return switch to monitor audio output level; noise limiter; ac convenience outlet; phono input; if output jack; send-receive switch with relay socket.
Table Model Dimensions: 12 3/4" x 21 3/8" x 17 1/8" deep.
Table Model Weight: 87 1/2 pounds.
Last Amateur Net Price: $1140.00.
Current Used Price: Price varies widely.

Heath AR-1, 2 & 3

AR-1

SIMILAR TO MODEL AR-2, no photograph or further information available.
Current Used Price: $10.00.

AR-2

1953-1955

Frequency Coverage: .55 to 35 mc in 4 bands.
Specifications: 5 tubes plus rectifier; 455 kc if; draws 45 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Self contained speaker, calibrated electrical bandspread, and noise limiter.
Dimensions: 11 1/2" x 5 3/4" x 6 3/4" deep.
Shipping Weight: 12 pounds.
Last Amateur Net Price: AR-2 Communications Receiver Kit, less cabinet..$25.50.
AR-2 Cabinet..... $ 4.50.
Current Used Price: AR-2 Communications Receiver with cabinet.....$15.00.
Remarks: No photograph available, resembles Model AR-3.

AR-3

1955-1961

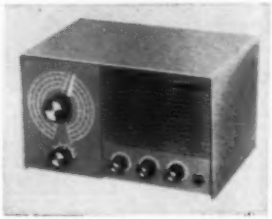
Frequency Coverage: .55 to 30 mc; (1) .55 to 1.5 mc. (2) 1.5 to 4.0 mc. (3) 4.0 to 10.0 mc. (4) 10.0 to 30.0 mc.
Specifications: 4 tubes plus rectifier; 455 kc if; draws 40 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Self contained speaker, calibrated electrical bandspread, and noise limiter.
Dimensions: 11 1/2" x 5 3/4" x 6 3/4" deep.
Shipping Weight: 12 pounds.
Last Amateur Net Price: AR-3 Communications Receiver Kit, less cabinet.$29.95.
AR-3 Cabinet..... $ 4.95.
Current Used Price: AR-3 Communications Receiver with cabinet.....$20.00.

Heath GC-1 & GC-1A

1955-Still Marketed

Frequency Coverage: .55 to 32 mc; (1) .55 to 1.6 mc. (2) 1.6 to 4.0 mc. (3) 4.0 to 9.0 mc. (4) 9.0 to 20.0 mc. (5) 20.0 to 32.0 mc.
Specifications: 10 transistors plus 6 diodes; self contained whip and high impedance unbalanced antenna input; 455 kc if; sensitivity of 10 microvolts for 10 db S/N ratio at 50 mw audio output on broadcast band, 2 microvolts on all other bands; selectivity of 3 kc at 6 db down; 400 mw audio output at 10% distortion into 35 ohm speaker or low impedance phones; draws 35 ma for 50 mw audio output from 12 v dc source of 8 size "C" cells or accessory ac supply.
Special Features: Self contained speaker, self contained whip antenna, calibrated electrical bandspread, ceramic filter if system, dial light switch, noise limiter, S-Meter and antenna trimmer.
Accessories: XP-2 117 v ac power supply.
Dimensions: 12" x 6 7/8" x 10" deep.
Weight: 17 pounds.
Last Amateur Net Price:
GC-1A Receiver Kit.....$109.95.
GC-1A Receiver, wired and tested$193.50.
XP-2 Power Supply Kit..... $ 9.95.
Current Used Price:
GC-1A Receiver, less ac power supply.... $ 85.00.
GC-1A Receiver with XP-2 Power Supply $ 95.00.

Heath GR-81



1961-Still Marketed.

Frequency Coverage: 140 kc to 18 mc.
Specifications: 2 tubes plus rectifier; long and short single wire antenna input; 1 watt audio output; draws 30 watts from 117 v, 50/60 cycle ac line.
Special Features: Regenerative detector, audio and power supply "basic" receiver; self contained speaker.
Dimensions: 10" x 7" x 7" deep.
Weight: 9 3/4 pounds.
Last Amateur Net Price:
GR-81 Receiver Kit.....$24.95.
Current Used Price:
GR-81 Receiver.....Not Priced.

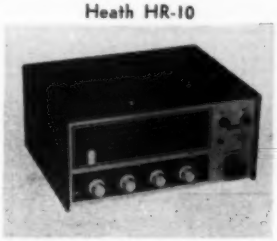
Heath GR-91

1961--Still Marketed.

Frequency Coverage: .55 to 30 mc; (1) .55 to 1.6 mc. (2) 1.6 to 4.0 mc. (3) 4.0 to 10.0 mc. (4) 10.0 to 30.0 mc.
Specifications: 4 tubes plus rectifier; 75 ohm unbalanced and 300 ohm balanced antenna input; 455 kc if; draws 30 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Electrical bandspread, internal speaker, S-Meter, noise limiter

and Q-Multiplier jack.
Dimensions: 12 1/4" x 5 1/4" x 8 1/4" deep.
Weight: 9 pounds.
Last Amateur Net Price:
GR-91 Receiver Kit.....$39.95.
Current Used Price:
GR-91 Receiver.....Not Priced.

Heath HR-10



1961-Still Marketed.

Frequency Coverage: (1) 3.5 to 4.0 mc. (2) 7.0 to 7.3 mc. (3) 14.0 to 14.4 mc. (4) 21.0 to 21.5 mc. (5) 28.0 to 29.9 mc.
Specifications: 6 tubes plus rectifier; 1680 kc if; requires 105-125 v, 50/60 cycle ac power.
Special Features: Crystal lattice filter, provisions for internal crystal calibrator, S-Meter, accessory and muting socket, antenna trimmer and noise limiter.
Accessories: Model HRA-10-1 100 kc crystal calibrator.
Shipping Weight: 21 pounds.
Last Amateur Net Price:
HR-10 Basic Amateur Receiver Kit..$82.95.
HRA-10-1 Crystal Calibrator Kit....$ 8.95.
Current Used Price:
HR-10 Receiver.....Not Priced.

Heath HR-20

1962-Still Marketed.

Frequency Coverage: (1) 3.5 to 4.0 mc. (2) 7.0 to 7.3 mc. (3) 14.0 to 14.35 mc. (4) 21.0 to 21.5 mc. (5) 28.0 to 29.7 mc.
Specifications: 7 tubes plus voltage regulator; 50-75 ohm unbalanced antenna input; sensitivity of less than 1 microvolt for 10 db S/N ratio; selectivity of 3 kc at 6 db down and 10 kc at 60 db down; requires 6 or 12 v, ac or dc heater supply and draws 85 to 125 ma from external 275 to 350 v dc supply.
Special Features: 3 mc crystal filter, crystal controlled BFO with selectable sideband, SSB/CW product detector, S-Meter, noise limiter and antenna trimmer.
Accessories:
AK-6 Mobile Base Mount Kit.
AK-75" PM Mobile Speaker Kit.
HP-10 Transistorized Mobile Power Supply Kit.
HP-20 AC Power Supply Kit.
Dimensions:
HR-20 Single Sideband Receiver.....
12 1/8" x 6 1/8" x 9 15/16" deep.
AK-7 Mobile Speaker.....
5" x 5" x 2 1/2" deep.
HP-10 Mobile Power Supply.....
8" x 7 1/2" x 6 1/2" deep.
HP-20 AC Power Supply.....
9" x 4 3/4" x 6".
Weight:
HR-20 Single Sideband Rcvr....20 pounds.
AK-7 Mobile Speaker.....5 pounds.
HP-10 Mobile Power Supply....10 pounds.
HP-20 AC Power Supply.....14 pounds.
Last Amateur Net Price:
HR-20 Single Sideband Rcvr.....$134.50.
AK-6 Base Mount Kit.....$ 4.95.
AK-7 Mobile Speaker Kit.....$ 5.95.
HP-10 Mobile Power Supply Kit..$ 44.95.
HP-20 AC Power Supply Kit.....$ 24.95.

Heath MR-1

1959-Still Marketed.
Frequency Coverage: (1) 3.5 to 4.0 mc. (2) 7.0 to 7.3 mc. (3) 14.0 to 14.35 mc. (4) 21.0 to 21.5 mc. (5) 28.0 to 29.7 mc.
Specifications: 7 tubes plus voltage regulator; 52 ohm unbalanced antenna input; 3.0 mc if; sensitivity of less than 1 microvolt for 10 db S/N ratio; selectivity of 3 kc at 6 db down and 10 kc at 60 db down; draws 3.30 at 6.3 v or 1.65 at 12.6 v ac or dc and 125 ma at 300 v dc from external power source.
Special Features: 3 mc crystal filter, SSB/CW product detector, S-Meter, noise limiter and antenna trimmer.
Accessories: AK-75" PM Mobile Speaker Kit.
AK-6 Mobile Base Mount Kit.
HP-10 Transistorized Mobile Power Supply Kit.
HP-20 AC Power Supply Kit.
Dimensions:
MR-1 Mobile Receiver.....12 1/8" x 6 1/2" x 9 15/16" deep.
AK-7 Mobile Speaker.....5" x 5" x 2 1/2" deep.
HP-10 Mobile Power Supply.....8" x 7 1/2" x 6 1/2" deep.
HP-20 AC Power Supply.....9" x 4 3/4" x 6".
Weight: MR-1 Mobile Receiver...19 pounds.
AK-7 Mobile Speaker.....5 pounds.
HP-10 Mobile Power Supply...10 pounds.
HP-20 AC Power Supply.....14 pounds.
Last Amateur Net Price:
MR-1 Mobile Rcvr. Kit.....$129.95.
AK-6 Mobile Base Mount Kit.....$ 4.95.
AK-7 Mobile Speaker Kit.....$ 5.95.
HP-10 Mobile Power Supply Kit..$ 44.95.
HP-20 AC Power Supply Kit.....$ 24.95.
Current Used Price:
MR-1 Mobile Receiver.....$105.00.
HP-10 Mobile Power Supply.....$ 25.00.
HP-20 AC Power Supply.....$ 32.00.

Heath RX-1

1958-Still Marketed.

Frequency Coverage: (1) 1.6 to 2.0 mc. (2) 3.5 to 4.0 mc. (3) 7.0 to 7.3 mc. (4) 14.0 to 14.35 mc. (5) 21.0 to 21.45 mc. (6) 29.9 to 27.23 mc. (7) 28.0 to 29.7 mc.
Specifications: 13 tubes plus regulator and rectifier; 50-72 ohm unbalanced and 150-300 ohm balanced antenna input; 50 and 1682 kc if; sensitivity of less than 1 microvolt for 10 db S/N ratio; adjustable selectivity of 5.0, 3.0, 2.0, 1.0 and 0.5 kc; 2 watts audio output into external 8 or 500 ohm speaker; draws 75 watts from 117 v, 50/60 cycle ac line.
Special Features: Calibrated scales for 6 and 2M coverage with external convertors, dual conversion if system with selectable sideband, notch filter, product detector for SSB/CW, internal crystal calibrator, S-Meter, noise limiter and accessory socket.
Accessories: AK-5 8" PM Speaker Kit.
Dimensions: 19 1/2" x 11 5/8" x 10" deep.
Weight: 52 pounds.
Last Amateur Net Price:
RX-1 Receiver Kit.....$299.95.
AK-5 Speaker Kit.....$ 10.95.
Current Used Price:
RX-1 Receiver less speaker.....$230.00.
RX-1 Receiver with AK-5 Speaker.....$237.00.

Knight-Kit R-55

1960-1962

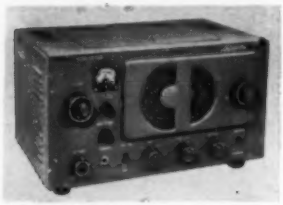
Frequency Coverage: .55 to 36 and 47 to 54 mc; (1) .55 to 19mc. (2) 1.9 to 6.0 mc. (3) 6.0 to 15.0 mc. (4) 13.0 to 36.0 mc. (5) 47.0 to 54.0 mc.
Specifications: 5 tubes plus rectifier; 50 ohm antenna input; 1650 if; sensitivity ranges from 4 microvolts on 80M to 10 microvolts on 6M; draws 60 watts from 117vac line.
Special Features: Internal speaker, calibrated electrical bandspread, flywheel tuning, noise limiter and antenna trimmer.
Accessories: X-10 Crystal Calibrator.
Dimensions: 14 1/4" x 8 5/8" x 11" deep.
Last Amateur Net Price:
R-55 Receiver in kit form.....$59.95
X-10 Crystal Calibrator in kit.... 10.95
Current Used Price:
R-55 Rec. with X-10 Xtal Cal.....70.00
R-55 Rec. less X-10 Xtal Cal.....67.50

Knight-Kit R-100

1958-1961

Frequency Coverage: 540 kc to 30 mc in 4 bands.
Specifications: 7 tubes plus regulator and rectifier; 50-300 ohm balanced or unbalanced antenna input; 455 kc if; sensitivity ranges from .75 microvolt on 80-40M to 1.5 microvolts on 10M for 10 db S/N ratio; Q multiplier provides adjustable selectivity from 300 cps to 4.5 kc at 6 db down; requires 110-125 v, 60 cycle ac power.
Special Features: Noise limiter, calibrated electrical bandspread, Q multiplier null and peak, regulated B+ to HFO, delayed AVC, antenna trimmer and exalted BFO injection.
Accessories: S-8 Speaker Kit, M-5 S-Meter Kit and Crystal Calibrator Kit.
Dimensions: 16 1/8" x 9 5/8" x 10 3/4" deep.
Shipping Weight: 31 pounds.
Last Amateur Net Price:
R-100 Receiver kit.....$99.95
S-8 Speaker kit..... 9.95
M-5 S-Meter kit..... 12.95
X-10 Xtal Calibrator kit..... 10.95
Current Used Price:
R-100 Rec. with all accessories.. 85.00
R-100 Rec. less all accessories.. 74.00

Lafayette KT-200 & HE-10WX



1959-Still Marketed.

Frequency Coverage: .55 to 31 mc; (1) .55 to 1.6 mc. (2) 1.6 to 4.8 mc. (3) 4.8 to 14.5 mc. (4) 10.5 to 31.0 mc.
Specifications: 8 tubes plus rectifier; 455 kc if; sensitivity of 1.25 microvolts for 10 db S/N ratio; selectivity of ±10 kc at 60 db down; 1.5 watts audio output into external 4 or 8 ohm speaker; requires 100-125 v, 50/60 cycle ac power.
Special Features: Electrical bandspread, noise limiter and S-Meter.
Accessories: HE-11 4" PM speaker.
Dimensions: 15 1/2" x 8 1/2" x 12" deep.
Shipping Weight: 22 pounds.
Last Amateur Net Price:
KT-200WX Receiver Kit.....$64.50.
HE-10WX wired and tested rcvr...$79.95.
HE-11 Speaker.....$ 7.95.
Current Used Price:
HE-10WX Rcvr., less speaker....$55.00.
HE-10WX Rcvr. with HE-11 Speaker.....$63.00.

Lafayette KT-320 & HE-30WX

1960-Still Marketed.

Frequency Coverage: .55 to 30 mc; (1) .55 to 1.6 mc. (2) 1.6 to 4.8 mc. (3) 4.8 to 14.5 mc. (4) 10.3 to 30.0 mc.
Specifications: 8 tubes plus rectifier; 455 kc if; sensitivity of 1 microvolt for 10 db down with Q-Multiplier, 10 kc at 60 db down; 1.5 watts audio output into external 4 or 8 ohm speaker; draws 50 watts from 105-130 v, 60 cycle ac line.
Special Features: Calibrated electrical bandspread, noise limiter, S-Meter, Q-multiplier and antenna trimmer.
Accessories: HE-11 4" PM speaker.
Dimensions: 19" x 7" x 10" deep.
Shipping Weight: 25 pounds.
Last Amateur Net Price:
KT-320 Receiver Kit.....$79.95.
HE-30WX wired and tested rcvr...$ 99.95.
HE-11 Speaker.....$ 7.95.
Current Used Price:
HE-30WX Receiver, less speaker. $60.00.
HE-30WX Rcvr. with HE-11 Speaker.....$68.00.

Mosley CM-1

1961-Still Marketed.

Frequency Coverage: Amateur band coverage 80 through 10M with 15 mc WWV band.
Specifications: 5 tubes plus 4 diodes; 3.5-4.1 mc tunable if and 455 kc fixed if; sensitivity of 0.5 microvolt for 10 db S/N ratio on 10M; selectivity of 2.5 kc at 6 db down; draws 33 watts from 115 v, 50/60 cycle ac line.
Special Features: Double conversion superhet with tunable if, product detector, S-Meter, noise limiter, muting terminals and accessory socket.
Accessories: CMS-1 Speaker; 5 crystals are provided and export, 230 volt, 50/60 cycle model is available.
Dimensions: CM-1 Receiver: 10 1/2" x 7 1/2" x 8" deep.
CMS-1 Speaker: 7 1/2" x 7 1/2" x 6" deep.
Weight: CM-1 Receiver: 14 pounds.
CMS-1 Speaker: 4 pounds.
Last Amateur Net Price:
CM-1 Receiver: $169.95.
CMS-1 Speaker: $ 16.95.
Current Used Price:
CM-1 Receiver with speaker.....$117.00.

National HFS

.948-1951

Frequency Coverage: 27 to 250 mc in 6 bands using plug-in coils.
Specifications: Complete receiver using super-regenerative detector or used as a tunable converter with conventional superhet receiver tuning 10.6 mc. Required separate power supply or battery source.
Special Features: Internal speaker and super-regenerative detector.
Accessories: Type 5891 AC Power Supply. Type 686S 6 Volt DC Power Supply.
Last Amateur Net Price: HFS Rcvr..$125.00
Type 5886 Power Supply.....$ 37.3
Current Used Price: HFS Receiver with Type 5886 Power Supply.....$70.00.

National HRO-5

.946-1948

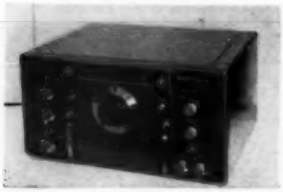
Frequency Coverage: 50 to 430 kc and .48 to 30 mc; coil sets A, B and C supplied with basic receiver with the rest as optional equipment: (A) 14.0 to 30.0 mc. (B) 7.0 to 14.4 mc. (C) 3.5 to 7.3 mc. (D) 1.7 to 4.0 mc. (E) .90 to 2.05 mc. (F) 480 to 960 kc. (G) 180 to 430 kc. (H) 100 to 200 kc. (J) 50 to 100 kc.
Specifications: 11 tubes plus rectifier; antenna input of between 300 and 600 ohms, balanced or unbalanced, dependent on frequency; 456 kc if; selectivity adjustable between .2 and 6.5 kc at 5 db down and 3 and 21 kc at 60 db down; audio output of 5,000 ohms into external output transformer and speaker; draws 70 watts from 115/230 v, 50/60 cycle ac line using the #697 Power Supply and 6.3 amperes at 6 v dc using the #686S Power Supply.
Special Features: Switched bandspread on 80, 40, 20 and 10 meters, noise limiter, crystal filter, S-Meter and standby switch.
Accessories: Type 697 AC Power Supply. Type 686S 6 volt Power Supply.
Type MCS Table Model Speaker.
Type RFSH Rack Mounted Speaker.
Last Amateur Net Price:
HRO-5 Receiver.....$274.35.
Type 697 AC Power Supply.....$ 20.35.
Type MCS Speaker.....$ 12.00.
Current Used Price: HRO-5 Receiver with AC Power Supply and Speaker....$ 85.00.

National HRO-7

1947-1949

Frequency Coverage: 50 to 430 kc and .48 to 30.0 mc; coil sets A, B, C and D supplied with basic receiver with the rest available as optional equipment: (A) 14.0 to 30.0 mc. (B) 7.0 to 14.4 mc. (C) 3.5 to 7.3 mc. (D) 1.7 to 4.0 mc. (E) .90 to 2.05 mc. (F) 480 to 960 kc. (G) 180 to 430 kc. (H) 100 to 200 kc. (J) 50 to 100 kc.
Specifications: 11 tubes plus regulator and rectifier; antenna input of between 300 and 600 ohms, balanced or unbalanced, dependent on frequency; 456 kc if; selectivity adjustable between .2 and 6.5 kc at 6 db down and 3 and 21 kc at 60 db down; audio output of 5,000 ohms into external output transformer and speaker; draws 74 watts from 115/230 v, 50/60 cycle ac line using the #697 Power Supply and 6.5 amperes at 6 v using the #686S Power Supply.
Special Features: Switched bandspread on 80, 40, 20 and 10 meters, noise limiter, crystal filter, S-Meter, tone control, temperature compensated oscillator, accessory socket and standby switch.
Accessories: Type 697 AC Power Supply Type 686S 6 volt Power Supply.
Type MCR Table Model Speaker.
Type RFSH Rack Mounted Speaker.
Last Amateur Net Price: HRO-7 Receiver with Type 697 Power Supply and MCR Speaker.....$311.36.
Current Used Price: HRO-7 Receiver with power supply and speaker. .....$125.00.

National HRO-50



1949-1951

Frequency Coverage: 50 to 430 kc and .48 to 35.0 mc; (A) 14.0 to 30.0 mc. (B) 7.0 to 14.4 mc. (C) 3.5 to 7.3 mc. (D) 1.7 to 4.0 mc. (E) .90 to 2.05 mc. (F) 480 to 960 kc. (G) 180 to 430 kc. (H) 100 to 200 kc. (J) 50 to 100 kc. (AA) 27.5 to 30.0 mc. (AB) 25.0 to 35.0 mc. (AC) 21.0 to 21.5 mc.
Specifications: 12 tubes plus regulator and rectifier; 300 to 600 ohm nominal antenna impedance, balanced or unbalanced; 455 kc if; audio output of 8 watts into external 8 [illegible]00/600 ohm speaker; draws 115 watts

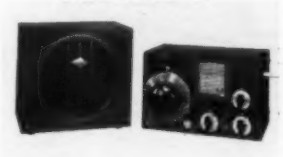
from 110-120 or 220-240 v, 50/60 cycle ac line.
Special Features: Calibrated electrical bandspread; noise limiter; crystal filter; S-Meter; tone control; temperature compensated HFO; dial light dimmer; antenna trimmer; standby switch; accessory/external power socket; provisions for internal crystal calibrator and NBFM adaptor.
Accessories: HRO-50TS Table Model Speaker.
NFM-50 Narrow-Band FM Adaptor.
XCU Crystal Calibrator.
SOJ-3 Select-O-Ject.
650S Vibrator Power Supply.
HRO-50RS Rack Mounted Speaker.
Last Amateur Net Price:
HRO-50 Receiver.....$349.00.
HRO-50TS Speaker.....$ 15.00.
XCU Crystal Calibrator.....$ 19.95.
Current Used Price: HRO-50 Receiver with speaker and Crystal Calibrator....$190.00.

National HRO-60

1952-Still Marketed.

Frequency Coverage: 50 to 430 kc and .48 to 54.0 mc coils available. Receiver supplied with 1.7 to 30 mc coils which may be switched to provide bandspread coverage on 80, 40, 20 and 10 meters.
Specifications: 15 tubes plus filament regulator, voltage regulator and rectifier; 456 and 2010 kc if; sensitivity better than 1 microvolt for 10 db S/N ratio; selectivity adjustable from .08 to 2.5 kc at 6 db down; operates from 115/230 v, 50/60 cycle ac line.
Special Features: Dual conversion superhet above 7.0 mc; calibrated electrical band spread; noise limiter; crystal filter; filament and B+ regulation on HFO; provision for crystal calibrator with front panel control; tone control; antenna trimmer; S-Meter; phono jack; provisions for narrow band FM adaptor; auxiliary power socket; high fidelity audio system and receive-standby switch.
Accessories: HRO-60TS Speaker
XCU-2 Crystal Calibrator
NFM-82-60 NFM Adaptor.
Dimensions: 10 1/8" x 19 3/4" x 16 1/2" deep
Weight: 88 pounds.
Last Amateur Net Price:
HRO-60 Receiver.....$745.00.
XCU-2 Crystal Calibrator.....$ 29.95.
NFM-82-60 NFM Adaptor.....$ 22.95.
HRO-60TS Speaker.....$ 19.95.
Current Used Price:
HRO-60 Receiver.....$325.00.
HRO-60TS Speaker.....$ 10.00.

National NCI-10A



1946-1948

Frequency Coverage: 27 to 290 mc with sets of plug-in coils.
Specifications: 4 tubes, balanced or unbalanced antenna, 7000 ohm audio output transformer and speaker; operates from batteries or #5886 Power Supply.
Special Features: TRF circuit with super-regenerative detector.
Accessories: Type 5886 Power Supply.
Last Amateur Net Price:
NC-1-10A Receiver.....$67.50.
Type 5886 Power Supply.....$22.43.
Current Used Price: NC-1-10A Receiver with power supply.....$40.00.

National NC-33

1948-1950

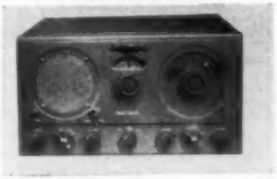
Frequency Coverage: 500 kc to 35 mc in 4 bands.
Specifications: Operates from 110-120 v, 50-60 cycle ac or dc line.
Special Features: Internal speaker; electrical bandspread; noise limiter and receive-standby switch.
Last Amateur Net Price: $65.95.
Current Used Price: $25.00.

National NC-46

1946-1949

Frequency Coverage: .54 to 30.0 mc; (1) .54 to 1.6 mc. (2) 1.55 to 4.6 mc. (3) 4.4 to 12.0 mc. (4) 11.5 to 30.0 mc.
Specifications: 9 tubes plus rectifier; balanced or unbalanced antenna input; 455 kc if; 4 watts audio output into external 10 ohm speaker; draws 65 watts from 110-130 v, 50/60 cycle ac or dc line.
Special Features: Bandspread tuning; noise limiter; tone control and external muting terminals.
Last Amateur Net Price: $97.50.
Current Used Price: $30.00.

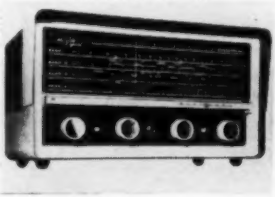
National NC-57



1947-1950

Frequency Coverage: .54 to 55.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.65 mc. (3) 4.6 to 13.5 mc. (4) 13.5 to 35.0 mc. (5) 35.0 to 55.0 mc.
Specifications: 7 tubes plus regulator and rectifier; 300 ohm nominal, balanced or unbalanced, antenna input; 455 kc if; draws 84 watts from 105-130 v, 50/60 cycle ac line.
Special Features: Self-contained speaker; electrical bandspread; noise limiter; antenna trimmer and accessory/power socket.
Accessories: SM-57 Tuning Meter.
Last Amateur Net Price: $89.50.
Current Used Price: $52.00.

National NC-60



1958-Still Marketed.
Frequency Coverage: .54 to 31.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.5 mc. (3) 4.0 to 12.0 mc. (4) 10.5 to 31.0 mc.
Specifications: 4 tubes plus rectifier; unbalanced antenna input; 455 kc if; operates on 115 v, 50/60 cycle ac or dc line.
Special Features: Internal speaker; electrical bandspread and receive-standby switch.
Dimensions: 7 5/8" x 13 1/2" x 8 5/8" deep.
Weight: 15 pounds.
Last Amateur Net Price: $59.95.
Current Used Price: $45.00.

National NC-66

1957-1961

Frequency Coverage: 150 to 400 kc and .5 to 23.0 mc; (1) 150 to 400 kc. (2) .5 to 1.4 mc. (3) 1.4 to 4.05 mc. (4) 4.0 to 11.4 mc. (5) 11.0 to 23.0 mc.
Specifications: 5 tubes plus selenium rectifier; ferrite loop antenna for bands 1 and 2 with whip for other bands; external antenna input of 50-300 ohms unbalanced; operates on 115 v ac or self-contained batteries; 220 v ac operation possible with accessory adaptor.
Special Features: Internal speaker; electrical bandspread; provisions for external direction finder for low frequency bands and receive-standby switch.
Accessories: RDF-66 Direction Finder Loop. 220 v Adaptor.
Dimensions: 9 11/16" x 12 5/16" x 10" deep.
Shipping Weight: 16 pounds.
Last Amateur Net Price:
NC-66 Receiver.....$129.95.
RDF-66 Direction Finder.....$ 17.00.

National NC-88

1953-1954

Frequency Coverage: .54 to 40 mc. (1) .54 to 1.6 mc. (2) 1.6 to 4.7 mc. (3) 4.7 to 15.0 mc. (4) 14.0 to 40.0 mc.
Specifications: 8 tubes plus rectifier; 1.5 watts audio output to internal 3.2 ohm speaker.

Special Features: Calibrated electrical bandspread; internal speaker; antenna trimmer; tone control; phono input; noise limiter and receive-standby switch.
Last Amateur Net Price: $99.95.
Current Used Price: $80.00.

National NC-98

1954-1956

Frequency Coverage: .54 to 40.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.7 mc. (3) 4.7 to 15.0 mc. (4) 14.0 to 40.0 mc.
Specifications: 8 tubes plus rectifier; 455 kc if; 1 rf and 2 if stages.
Special Features: Calibrated electrical bandspread; crystal filter; tone control; S-Meter; delayed AVC; antenna trimmer; noise limiter; phono input and receive-standby switch.
Last Amateur Net Price: $149.95.
Current Used Price: $96.00.

National NC-105

1961-Still Marketed.

Frequency Coverage: .55 to 30 mc; (1) .55 to 1.6 mc. (2) 1.6 to 4.5 mc. (3) 4.0 to 12.0 mc. (4) 11.0 to 30.0 mc.
Specifications: 5 tubes plus rectifier; 50-300 ohms antenna input; 455 kc if; 3.2 ohm audio output to internal speaker; draws 49 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Internal speaker; Q-Multiplier; separate product detector for CW/SSB reception; noise limiter; electrical bandspread; S-Meter and AGC on all modes of reception.
Dimensions: 7 5/8" x 13 1/2" x 8 5/8" deep. (Steel cabinet model.)
Shipping Weight: 28 pounds.
Last Amateur Net Price:
NC-105, steel cabinet: $119.95.
NC-105W, Wood cabinet: $139.95.
Current Used Price: NC-105.....$92.00.

National NC-109

1957-1960

Frequency Coverage: .54 to 40.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.7 mc. (3) 4.7 to 15.0 mc. (4) 14.0 to 40.0 mc.
Specifications: 9 tubes plus regulator and rectifier; 50-300 ohm, balanced or unbalanced, antenna input; 455 kc if; sensitivity of 1 to 2 microvolts for 10 db S/N ratio; selectivity of from .2 to 5.2 kc at 6 db down to 10 to 29.5 kc at 60 db down; 1.5 watts audio output into external 3.2 ohm speaker.
Special Features: Calibrated electrical bandspread; crystal filter; S-Meter; separate product detector for CW/SSB reception; noise limiter; antenna trimmer; tone control; phono jack and accessory socket.
Accessories: XCU Crystal Calibrator.
NFM-83-60 Narrow Band FM Adaptor.
Table Model Speaker.
Dimensions: 10" x 16 13/16" x 10 7/8" deep.
Shipping Weight: 35 pounds.
Last Amateur Net Price:
NC-109 Receiver.....$199.95.
Matching Speaker.....$ 17.50.
Current Used Price:
NC-109 Receiver with speaker...$125.00.

National NC-125

1950-1956

Frequency Coverage: .56 to 35.0 mc; (1) .56 to 1.6 mc. (2) 1.6 to 4.4 mc. (3) 4.4 to 13.0 mc. (4) 12.0 to 36.0 mc.
Specifications: 9 tubes plus regulator and rectifier; sensitivity of 3 microvolts on 10 meter band for 10 db S/N ratio.
Special Features: Select-O-Ject audio circuit; S-Meter; antenna trimmer; noise limiter; tone control and receive-standby switch.
Accessories: NC-125TS Speaker.
Last Amateur Net Price:
NC-125 Receiver.....$149.50.
NC-125TS Speaker.....$ 11.00.
Current Used Price:
NC-125 Receiver.....$ 95.00.
NC-125TS Speaker.....$ 10.00.

National NC-155

1961-Still Marketed.

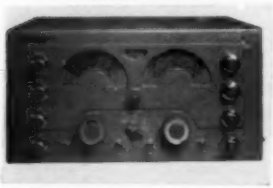
Frequency Coverage: (10 3.5 to 4.0 mc. (2) 7.0 to 7.3 mc. (3) 14.0 to 14.35 mc. (4) 21.0 to 21.5 mc. (5) 28.0 to 30.0 mc. (6) 50.0 to 54.0 mc.
Specifications: 8 tubes plus rectifier and regulator; coaxial antenna input; 230 and 2215 kc if; 1 watt at 10% distorion audio output to 3.2 ohm load; sensitivity of better than 1 microvolt for 10 db S/N ratio; selectivity adjustable from .6 to 5 kc; operates from 105-125 v, 50/60 cycle ac line.
Special Features: Double conversion superhet; Ferrit if filter with adjustable selectivity; 60:1 planetary tuning drive; S-Meter; provisions for crystal calibrator with front panel corrector; product detector for CW/SSB reception; noise limiter; antenna trimmer and receive-standby switch.
Accessories: XCU-109 Crystal Calibrator.
NTS-3 Speaker.
Dimensions: 8 5/8" x 15 5/8" x 9" deep.
Weight: 28 pounds.
Last Amateur Net Price:
NC-155 Receiver.....$199.95.
XCU-109 Xtal Calibrator.....$ 20.95.
NTS-3 Speaker.....$ 19.95.
Current Used Price:
NC-155 Receiver.....$149.00.

National NC-173

1947-1949

Frequency Coverage: .54 to 31.0 and 48.0 to 56.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.3 mc. (3) 4.3 to 12.0 mc. (4) 12.0 to 31.0 mc. (5) 48.0 to 56.0 mc.
Specifications: 11 tubes plus regulator and rectifier; 500 ohm average antenna input impedance, balanced or unbalanced; 455 kc if; 8 or 500 ohm audio output impedance; draws 83 watts from 110-120 or 220-240 v, 50/60 cycle ac line.
Special Features: 6 position crystal filter; S-Meter; noise limiter; phono jack; tone control; antenna trimmer; receive-standby switch and external power socket.
Last Amateur Net Price: $179.50.
Current Used Price: $109.00.

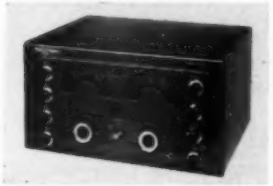
National NC-183



1947-1952

Frequency Coverage: .54 to 31.0 mc and 48.0 to 56.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.3 mc. (3) 4.3 to 12.0 mc. (4) 12.0 to 31.0 mc. (5) 48.0 to 56.0 mc.
Specifications: 14 tubes plus regulator and rectifier; 300 ohm nominal, balanced or unbalanced antenna input; 455 kc if; 8 watts audio output into 8 or 500 ohm load; draws 125 watts from 110-120 or 220-240 v, 50/60 cycle line.
Special Features: Calibrated electrical bandspread; S-Meter; tone control; crystal filter; noise limiter; phono jack; antenna trimmer and accessory/external power socket.
Last Amateur Net Price: NC-183 Receiver complete with speaker.....$269.00.
Current Used Price: NC-183 Receiver with speaker.....$139.00.

National NC-183D



1952-1958

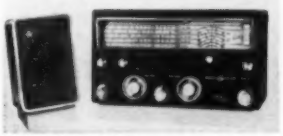
Frequency Coverage: .54 to 31.0 mc and 48.0 to 56.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.4 mc. (3) 4.4 to 12.0 mc. (4) 12.0 to 31.0 mc. (5) 48.0 to 56.0 mc.
Specifications: Updated version of the NC-183 with the following additional features: Dual conversion on bands 3, 4, and 5; new crystal filter with front panel control; new noise limiter and improved sensitivity.
Last Amateur Net Price: $449.00.
Current Used Price: $210.00.

National NC-188

1957-1960

Frequency Coverage: .54 to 40 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.7 mc. (3) 4.7 to 15 mc. (4) 14.0 to 40.0 mc.
Specifications: 8 tubes plus rectifier; 50-300 ohm, balanced or unbalanced antenna input; sensitivity of better than 2.5 microvolts for 10 db S/N ratio; selectivity of 5.2 kc at 6 db down and 22 kc at 60 db down; 1.5 watts audio output into external speaker.
Special Features: Calibrated electrical bandspread; S-Meter; noise limiter; tone control; antenna trimmer and receive-standby switch.
Accessories: NTS-1 Speaker.
Dimensions: 10" x 16 13/16" x 10 7/8" deep.
Shipping Weight: 35 pounds.
Last Amateur Net Price:
NC-188 Receiver.....$159.95.
NTS-1 Speaker.....$ 17.50.
Current Used Price:
NC-188 Receiver.....$ 98.00.
NTS-1 Speaker.....$ 10.00.

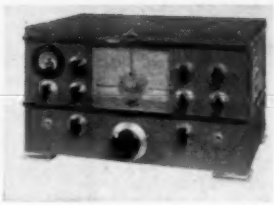
National NC-190



1961-Still Marketed.

Frequency Coverage: .54 to 30 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.0 mc. (3) 4.0 to 10.0 mc. (4) 10.0 to 20.0 mc. (5) 20.0 to 30.0 mc.
Specifications: 8 tubes plus rectifier and regulator; coaxial antenna input; 230 and 2215 kc if; 1 watt at 10% distortion audio output to 3.2 ohm load; sensitivity of better than 1 microvolt for 10 db S/N ratio; selectivity adjustable from .6 to 5 kc; operates from 105-125 v, 50/60 cycle ac line.
Special Features: Double conversion superhet; Ferrite if filter with adjustable selectivity; 60:1 planetary tuning drive; S-Meter; calibrated electrical bandspread on amateur and short wave broadcast bands; provisions for crystal calibrator with front panel corrector; productor for CW/SSB reception; noise limiter; antenna trimmer and receive-standby switch.
Accessories: XCU-109 Crystal Calibrator.
NTS-3 Speaker.
Dimensions: 8 5/8" x 15 5/8" x 9" deep.
Weight: 28 pounds.
Last Amateur Net Price:
NC-190 Receiver.....$219.95.
XCU-109 Crystal Calibrator.....$ 20.95.
NTS-3 Speaker.....$ 19.95.
Current Used Price: NC-190 Receiver with XCU-109 Crystal Calibrator.....$175.00.

National NC-240C, CS & D



NC-240C: 1946-1949
NC-240D: 1947-1949

Frequency Coverage, NC-240C: .49 to 30.0 mc; (1) .49 to 1.0 mc. (2) 1.0 to 2.0 mc. (3) 1.7 to 4.0 mc. (4) 3.5 to 7.3 mc. (5) 7.0 to 14.4 mc. (6) 14.0 to 30.0 mc.
NC-240D: Sames as NC-240C except 4 additional bandspread ranges for 10, 20, 40 and 80 meters.
NC-240CS: 200 to 400 kc and 1 mc to 30 mc; (1) 200 to 400 kc. (2) 1.0 to 2.0 mc. (3) 1.7 to 4.0 mc. (4) 3.5 to 7.3 mc. (5) 7.0 to 14.4 mc. (6) 14.0 to 30.0 mc.
Specifications: 11 tubes plus rectifier; 500 ohm balanced or unbalanced antenna input; 455 kc if; 8 watts audio output to external 10,000 ohm plate to plate output transformer for NC-240C, internal transformer with 8 and 500 ohm output windings for NC-240 CS; selectivity adjustable from .2 to 7.5 kc at 6 db down and from 2.0 to 21.5 kc at 60 db down; requires 110-120 or 220-240 v, 50/60 cycle ac power.
Special Features: Calibrated amateur band bandspread on NC-240D; crystal filter; noise limiter; S-Meter; tone control; phono jack; accessory/external power socket.
Last Amateur Net Price: $375.00.
Current Used Price: $100.00.

National NC-270

1960-Still Marketed.

Frequency Coverage: (1) 3.5 to 4.0 mc. (2) 7.0 to 7.3 mc. (3) 14.0 to 14.4 mc. (4) 21.0 to 21.5 mc. (5) 28.0 to 29.7 mc. (6) 50.0 to 54.0 mc.
Specifications: 8 tubes plus regulator and rectifier; 52 ohm unbalanced antenna input; 230 and 2445 kc if; 1.5 watts audio output at 10% distortion to external 3.2 ohm speaker; sensitivity of better than 1 microvolt for 10 db S/N ratio; LSB and USB selectivity of 3 kc at 6 db down and 12 kc at 40 db down; AM/CW selectivity adjustable from slightly less than 1 kc to slightly less than 6 kc at 6 db down to 6 to 17 kc at 40 db down; draws 75 watts from 105-125 v, 50/60 cycle ac line.
Special Features: Double conversion superhet with adjustable bandwidth and selectable sideband; product detector for SSB reception; T-Notch filter; noise limiter; S-Meter; antenna trimmer; crystal calibrator with front panel corrector; crystal controlled 2nd converter oscillator; receive-standby switch.
Accessories: NTS-3 Speaker.
Dimensions: 8 5/8" x 15 5/8" x 9" deep.
Weight: 28 pounds.
Last Amateur Net Price:
NC-270 Receiver.....$279.95.
NTS-3 Speaker.....$ 19.95.
Current Used Price:
NC-270 Receiver.....$185.00.
NTS-3-Speaker.....$ 10.00.

National NC-300

1955-1958

Frequency Coverage: (1) 1.8 to 2.0 mc. (2) 3.5 to 4.0 mc. (3) 7.0 to 7.3 mc. (4) 14.0 to 14.4 mc. (5) 21.0 to 21.5 mc. (6) 26.5 to 27.5 mc. (7) 28.0 to 29.7 mc. Following bandswitch positions and calibrated scales provided for accessory converters: (8) 49.5 to 54.5 mc. (9) 143.5 to 148.5. (10) 220.0 to 225.0 mc.
Specifications: 10 tubes plus filament regulator, voltage regulator and rectifier; 50-300 ohms antenna input impedance; 80 and 2215 kc if; 1 watt audio output into external 8 ohm speaker; noise figure of 4 db on 20 meters and 5 db on 10 meters; selectivity of .5, 3.5 and 8 kc at 6 db down; draws 60 watts from 110-120 v, 60 cycle ac line.
Special Features: Double conversion superhet; optional crystal calibrator; crystal filter; separate product detector for SSB reception; noise limiter; tone control; S-Meter; phono jack; separate rf and if gain controls; calibration corrector; accessory converter switching using 30 to 35 mc tunable if; muting terminals and accessory socket with af input, if output and rf gain points brought out.
Accessories:
NC-300TS Speaker.
XCU-300 Crystal Calibrator.
NC-300CC Converter Cabinet.
NC-300 C1 220-225 mc Converter.
NC-300 C2 143.5-148.5 mc Converter.
NC-300 C6A 49.5-54.5 mc Converter.
Dimensions: 11 1/4" x 19 1/4" x 15" deep.
Shipping Weight: 60 pounds.
Last Amateur Net Price:
NC-300 Receiver.....$349.95.
NC-300TS Speaker.....$ 19.95.
Current Used Price:
NC-300 Receiver.....$215.00.
NC-300TS Speaker.....$ 10.00.

National NC-303

1958-Still Marketed.

Frequency Coverage: (1) 1.8 to 2.0 mc. (2) 3.5 to 4.0 mc. (3) 7.0 to 7.3 mc. (4) 14.0 to 14.4 mc. (5) 21.0 to 21.5 mc. (6) 26.5 to 27.5 mc. (7) 28.0 to 29.7 mc. Following bandswitch positions and calibrated scales provided for accessory converters using 30 to 35 mc, tunable if input: (8) 49.5 to 54.5 mc. (9) 143.5 to 148.5 mc. (10) 220.0 to 225.0 mc.
Specifications: 12 tubes plus current regulator, voltage regulator and rectifier; 80 and 2215 kc if; sensitivity of better than 1 microvolt for 10 db S/N ratio; selectivity of .4, 2.0, 3.5 and 8.0 kc at 6 db down; operates from 110-130 v, 50/60 cycle ac line.
Special Features: Double conversion superhet with selectable sideband; separate product detector and noise limiter for SSB reception; automatic noise limiter for AM reception; crystal controlled 2nd converter oscillator; fast attack, slow release AGC for SSB/CW; Q-Multiplier; tone control; provisions for optional crystal calibrator with front panel corrector and WWV reception; S-Meter; muting terminals with provisions for accessory converter switching; muting and provision for control of rf gain during transmission.
Accessories:
NTS-2 Speaker.

XCU-303 Crystal Calibrator and WWV ceiver Converter.
NC-303 Converter Cabinet.
NC-300C1 1 1/4 Meter Converter.
NC-300C2 2 Meter Converter.
NC-300C6A 6 Meter Converter.
Dimensions: 11 1/4" x 19 1/2" x 15" deep.
Weight: 64 pounds.
Last Amateur Net Price:
NC-303 Receiver.....$449.00.
NTS-2 Speaker.....$ 19.95.
Current Used Price:
NC-303 Receiver.....$335.00.
NTS-2 Speaker.....$ 10.00.

National NC-400

1950-Still Marketed.

Frequency Coverage: . .54 to 31.0 mc; (1) .54 to 1.1 mc. (2) 1.1 to 2.1 mc. (3) 2.1 to 4.1 mc. (4) 4.1 to 7.0 mc. (5) 6.9 to 12.2 mc. (6) 11.8 to 20.4 mc. (70 19.6 to 31.0 mc.
Specifications: 16 tubes plus regulator and rectifier; 455 and 2175 kc if; sensitivity of less than 1 microvolt for 10 db S/N ratio; frequency stability of .002% after warm-up; requires 110 or 220 v, 50/60 cycle ac power.
Special Features: Double conversion superhet above 7 mc; manual tuning with option of using internal or external crystals for all oscillators; 5 crystal sockets provided for fixed channel operation; selectable sideband if system with adjustable selectivity and crystal filter which may be removed to install up to 3 mechanical filters; product detector for SSB reception; fast attack, slow decay AGC for SSB reception; amplified S-Meter; automatic noise limiter for AM, manual noise limiter for CW/SSB; optional crystal calibrator with front panel corrector; tone control; antenna trimmer; if, detector and AGC outputs terminated on rear of chassis for use with external loads of combinere.
Accessories:
NTS-2 Speaker.
XCU-400 Crystal Calibrator.
NC-400 DMK Diverarity Modification Kit.
NC-400 FH Mechanical Filter Housing.
MX-400 40 Channel Crystal Adaptor.
Dimensions: 11 1/4" x 19 1/2" x 10" deep.
Shipping Weight: 72 pounds.
Last Amateur Net Price:
NC-400 Receiver.....$895.00.
NTS-2 Speaker.....$ 21.95.
Current Used Price:
NC-400 Receiver: $500.00. Price varies widely.
NTS-2 Speaker: $10.00.

National SW-54

1951-1958

Frequency Coverage: .54 to 30.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 4.7 mc. (3) 4.6 to 14.5 mc. (4) 12.0 to 30.0 mc.
Specifications: 4 tubes plus rectifier; 455 kc if; 1.8 watts audio output into internal speaker; selectivity of 3.4 kc at 6 db down and 49.5 kc at 60 db down with 100 microvolts input; draws 25 watts from 105-130 v, 50/60 cycle ac or dc line.
Special Features: Internal speaker; receive-standby switch and speakerphone switch.
Last Amateur Net Price: $59.95.
Current Used Price: $30.00.

RME 45

1946-?

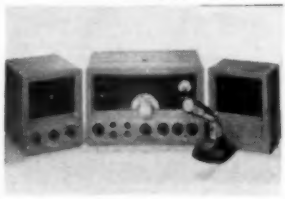
Frequency Coverage: .54 to 33.0 mc; (1) .54 to 1.6 mc. (2) 1.6 to 2.9 mc. (3) 2.9 to 5.4 mc. (4) 5.4 to 9.8 mc. (5) 9.8 to 18.0 mc. (6) 18.0 to 33.0 mc.
Specifications: 8 tubes plus regulator and rectifier; balanced or unbalanced antenna input; 455 kc if; 4/6 ohm audio output; operates from 115 v, 60 cycle ac line.
Special Features: Calibrated mechanical bandspread; crystal filter; tone control; S-Meter; noise limiter and receive-standby-transmit switch.
Last Amateur Net Orice: $198.70.
Current Used Price: $75.00.

RME 84 & 84 A

1946-?

Frequency Coverage: .54 to 44.0 mc; (1) .54 to 1.65 mc. (2) 1.65 to 5.0 mc. (3) 5.0 to 15.0 mc. (4) 15.0 to 44.0 mc.
Specifications: 7 tubes plus rectifier; balanced or unbalanced, 300 ohm antenna input; 455 kc if; audio output of 1.1 watts to internal speaker; draws 62 watts from 117 v, 60 cycle ac line.
Special Features: Internal speaker; mechanical bandspread system; noise limiter; tone control; socket for optional S-Meter; accessory/external power socket and receive-standby switch.
Dimensions: 9 3/8" x 18" x 9 3/4" deep.
Last Amateur Net Price: $98.70.
Current Used Price: $52.00.

RME 4300



1956-1958

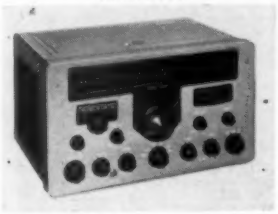
Frequency Coverage: Amateur band coverage, 1.76 to 29.8 mc.
Specifications: 6 tubes plus regulator and rectifier; 455 kc if; 4 ohm audio output; selectivity of 2.8 kc at 6 db down and 14 kc at 60 db down; sensitivity of 2 microvolts for 10 db S/N ratio; operates from 117 v, 50/60 cycle ac line.
Special Features: Crystal filter with adjustable selectivity; dual speed tuning drive; noise limiter; S-Meter; provisions for use with external SSB adaptor; receive-transmit-standby switch.
Dimensions: 10" x 16 1/2" x 10" deep.
Last Amateur Net Price: $194.00.
Current Used Price: $125.00.

RME 4350

1958-1960

Frequency Coverage: (1) 1.8 to 2.0 mc. (2) 3.5 to 4.0 mc. (3) 7.0 to 7.3 mc. (4) 14.0 to 14.35 mc. (5) 21.0 to 21.5 mc. (6) 28.95 to 29.7 mc.
Specifications: 8 tubes plus regulator and rectifier; balanced or unblanced antenna input; 455 and 2195 kc if frequencies; sensitivity of 2 microvolts for 10 db S/N ratio; audio output of 1.5 watts into external 4 ohm speaker; draws 65 watts from 117 v, 50/60 cycle ac line.
Special Features: Double conversion superhet; dual speed tuning drive; crystal calibrator with front panel corrector; crystal filter with adjustable selectivity; antenna trimmer; noise limiter; S-Meter; provisions for external SSB adaptor; adjustable BFO injection; receive-transmit-standby switch.
Dimensions: 10" x 16 1/2" x 10" deep.
Weight: 32 pounds.
Last Amateur Net Price: $249.00.
Current Used Price: $150.00.

RME 6900



1960-Still Marketed.

Frequency Coverage: (1) 10.0 to 11.0 mc. (2) 3.5 to 4.0 mc. (3) 7.0 to 7.3 mc. (4) 14.0 to 14.4 mc. (5) 21.0 to 21.5 mc. (6) 28.0 to 29.7 mc.
Specifications: 11 tubes plus regulator and 2 silicon diodes; antenna input of 50-400 ohms, balanced or unbalanced; 57 and 2195 kc if frequencies; sensitivity of 1 microvolt for 50 mw audio output at 10 db S/N ratio; adjustable selectivity if .5, 2.0 and 3.6 kc at 6 db down and 3.3, 7.3 and 11 kc at 60 db down; audio output of 1 watt into external 4 and 500 ohm loads; draws 55 watts from 117 v, 50/60 cycle ac line.
Special Features: Dual conversion superhet; crystal controlled 2nd conversion oscillator; T-Notch filter; if noise limiter system; separate SSB detector; internal crystal calibrator with front panel corrector; adjustable BFO injection; antenna trimmer; adjustable delay AGC system; S-Meter; receive-transmit-standby switch.
Dimensions: 9 3/4" x 17" x 12 1/8" deep.
Weight: 35 pounds.
Last Amateur Net Price: $349.00.
Current Used Price: $250.00.

Technical Materiel GPR-90

1956-1959

Frequency Coverage: .54 to 31.0 mc. in six bands.
Specifications: 13 tubes plus rectifier and voltage regulator; 75 ohm unbalanced or 300 ohm balanced antenna input; 4, 8, 16 and 600 ohm audio output impedance; sensitivity 1 microvolt for 10-1 signal to noise power ratio; selectivity variable in 6 steps from 200 cy to 5KC; 105-125vac 50/60 cy., at approx. 90 watts; also 250 vdc @ .01A and 6v. @ 6A.
Special Features: dial locks; noise limiter; calibrated "S" meter.
Dimensions: 20" x 10" x 15" in cabinet; also can be rack mounted.
Weight: 52 pounds.
Last Amateur Net Price: $495.00
Current Used Price: $325.00

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COLLINS 75A4 receiver .. 495.00
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COLLINS 270G-3 speaker . 15.00
EICO 723 transmitter ... 55.00
ELMAC PSA-500 AC power supply 20.00
GLOBE KING 500-A transmitter 279.00
GLOBE CHAMP 300-A transmitter 225.00
GLOBE SCOUT Deluxe transmitter 99.00
GLOBE CHIEF Deluxe transmitter 44.00
GLOBE SCOUT 680-A transmitter 59.00
GLOBE VOX-10 & OT-10 10.00
GLOBE SCOUT 40-A transmitter 45.00
GONSET GSB-101 amplifier 229.00
GONSET G66 3 way supply 125.00
HALLICRAFTER SX-101A receiver 299.00
HALLICRAFTER SX-101 Mark I 229.00
HALLICRAFTER SX-111 receiver 189.00
HALLICRAFTER S-53-A receiver 59.00
HALLICRAFTER R-42 speaker 15.00
HALLICRAFTER S-40B receiver 59.00
HEATH DX-100 ..... 159.00
HEATH DX-100B transmitter 169.00
HEATH COMMANCHE, CHEYANNE, HP-10. mike, speaker 199.00
HEATH VX-1 VOX control 10.00
JOHNSON Invader 2000 transmitter 895.00
JOHNSON Valiant transmitter 299.00
JOHNSON THUNDER BOLT 6N2 ..... 349.00
JOHNSON VIKING II transmitter 149.00
JOHNSON VIKING I transmitter 99.00
JOHNSON 122 VFO 25.00
JOHNSON Challenger transmitter 89.00
JOHNSON TR switch ... 20.00
JOHNSON Phone patch .. 17.50
JOHNSON 100kc crystal calibrator 10.00
MOSLEY CM-1 receiver .. 150.00
NATIONAL NC-300 receiver 239.00
NATIONAL NC-173 receiver speaker 109.00
NATIONAL NC-125 receiver 99.00
NATIONAL NC-57 receiver 49.00
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HALLICRAFTER S-108 receiver
HALLICRAFTER S-120 receiver
HALLICRAFTER SX-140 kit
HALLICRAFTER S-119 receiver
HALLICRAFTER S-119 kit receiver
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JOHNSON Invader 200 transmitter
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Measure L and C

Fig. 1. Completed L-C probe.

Build this inexpensive probe for simplifying the job. Operated from an audio signal generator, it has a range of 12.6 mmfd to 1260 mfd, and 63.4 uh to 6340 henries.

EVERY SERIOUS TECHNICIAN owns an audio signal generator. This is an extremely useful instrument and, in addition to its many other jobs, it can be used to measure capacitance and inductance. Most such instruments may be tuned from 20 to 200,000 cps, and this will permit L and C measurements over a wide range.

Fig. 3 shows the method. The unknown component is connected with a known component of the opposite sort to form a series-resonant circuit. Thus, for checking capacitance (Fig. 3A), the unknown C is in series with a known inductance; and for checking inductance (Fig. 3B), the unknown L is in series with a known capacitance. The oscillator develops a voltage drop across a low resistance, R, connected in series with L and C, and this voltage excites the circuit. An af milliammeter, M, deflects to a peak when the oscillator is tuned to the resonant frequency of the L-C combination, and this response is sharp if R is low. The frequency then is read from the oscillator dial, and the unknown component is calculated from this frequency f and the known component: $C = 0.0253/f^2L$, or $L = 0.0253/f^2C$. (C is in farads, L in henries, and f in cycles per second.) A single capacitor and inductor permit measurement of virtually all coils and capacitors, fixed and variable, ordinarily encountered in the field.

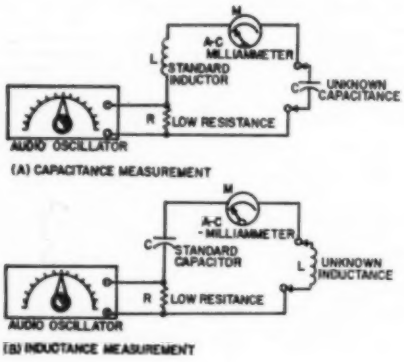

FIGURE 3

Technicians who use this method usually keep on hand an accurate capacitor and inductor but these components are easily mislaid or damaged when loose. The ac milliammeter is not a common instrument in most shops, and the circuit must be assembled each time it is needed. These are nuisances which may be avoided by building a simple, inexpensive L-C probe which is always on hand to be connected to the oscillator when needed and in which the standard capacitor and inductor are protected. Figs. 1, 2, and 4 show details of this probe.

Probe Description

Fig. 4 shows the complete circuit of the

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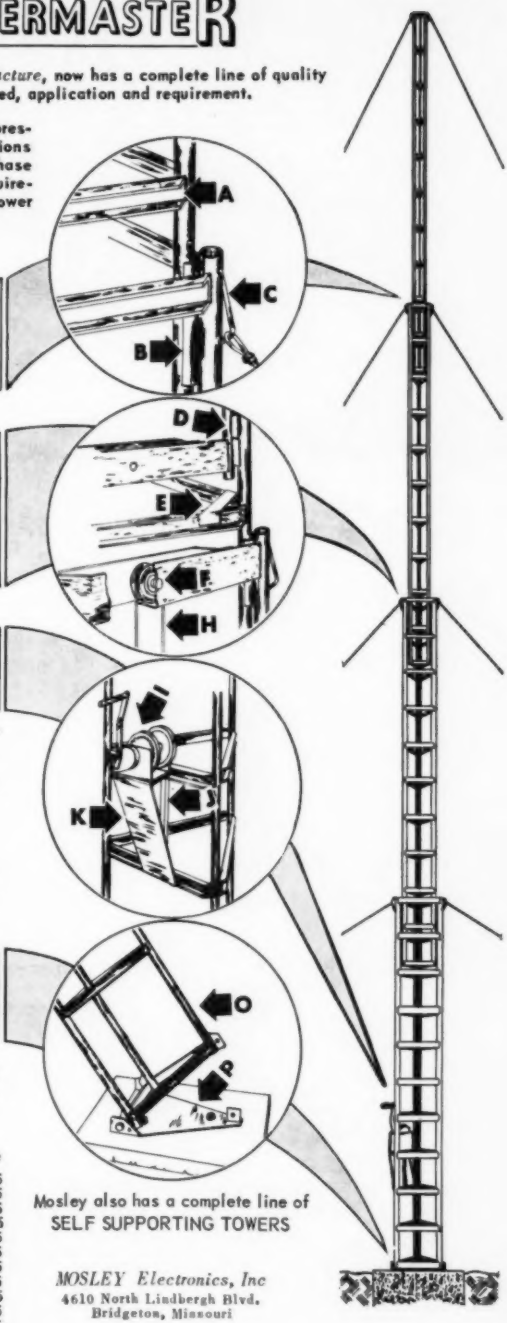
G - All Welded Construction (*done by certified personnel under strict inspection and manufacturing controls*).
H - Galvanized Aircraft Type Raising Cables.

I - Geared Crank-up Winch and Safety Lock.
J - Extra Reinforcing Spreader.
K - Heavy Steel Winch Frame.

features not illustrated

L - Predrilled Rotor Mounting Plate with series 300 will accept CDR type rotor - series 400, 500, 650, 700, 750 will accept either CDR or Prop-Pitch types.
M - 2 inch I. D. Mast Sleeves.
N - Iron Phosphate Rust-proof Undercoating plus a Tough Triple Coat Epoxy Resin Finish - *Galvanized series are also available at only a slightly higher cost.*

O - All Tubular Leg Members of High Strength Mechanical Steel Tubing - *Conforming to the Formed Steel Institute standards.*
P Heavy Duty Steel Hinged Base Plate.



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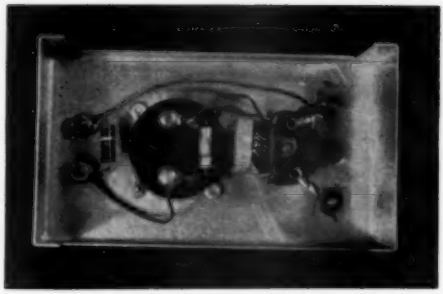


Fig. 2. Inside view of the probe. Notice the simple direct wiring and the few components needed.

probe. Here, the standard inductor, L, is a 50-millihenry rf choke and the standard capacitor, C, is an 0.01-mfd silvered mica capacitor. The af milliammeter consists of a 1-inch 0-50 dc microammeter, M, shunted by a 1N34 germanium diode, D. The oscillator is connected to terminals 1 and 2, and develops the signal voltage across a 47-ohm carbon resistor, R. An unknown capacitor is connected to terminals 3 and 4, or an unknown inductor (coil) to terminals 4 and 5. (This arrangement obviates the need for function switches.) The signal-voltage level is controlled by adjusting the output control of the audio oscillator and is between 0.3 and 0.7 volt rms for full-scale deflection of meter M.

The probe is built into an aluminum chassis box, 5¼" long, 3" wide, and 2⅜" high. Fig. 2

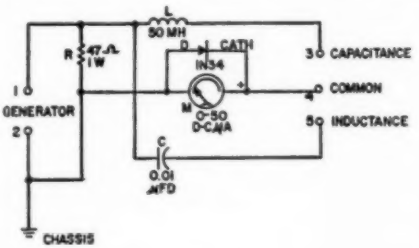
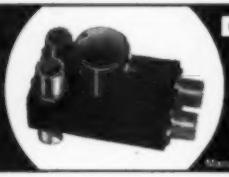


FIGURE 4

C—0.01 mfd silvered mica—Aerovox 1464
D—General-purpose germanium diode—1N34
L—50-mh radio-frequency choke—Miller 918
M—1-inch 0-50 d-c microammeter—Lafayette TM-200
R—47-ohm 1-watt carbon or composition resistor



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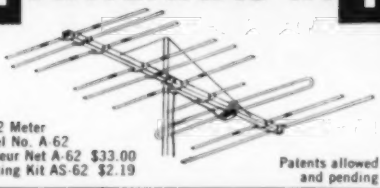

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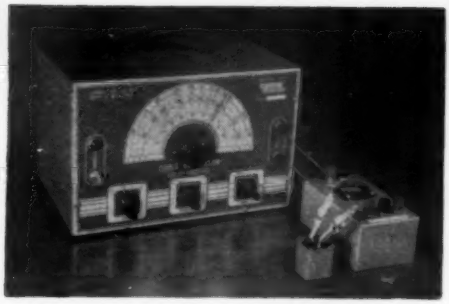

Fig. 5. Test setup with oscillator and probe. Here, a small iron-core inductor is under measurement.

shows internal construction. The only precaution is to keep the wiring away from the chassis and to mount the choke at least ⅛ inch from the chassis (use a 2-inch-long 6-32 screw).

Standard tolerances in the specified inductor and capacitor insure a measurement accuracy of 5 to 10 percent. But higher precision may be obtained by hand-picking L and C for exact specified values of 50 mh and 0.01 mfd. The measurement range is usefully wide: for capacitance, 12.6 mmfd at 200 kc to 1260 mfd at 20 cps; for inductance, 6340 henries at 20 cps to 63.4 μh at 200 kc.

Operation

To make a measurement (1), connect probe to oscillator. Terminal 2 must be connected to the grounded output terminal of the oscillator. (2) Switch-on oscillator. (3) Connect unknown capacitor to terminals 3 and 4, *or* unknown inductor to terminals 4 and 5, using shortest possibe leads. (4) Tune oscillator for peak deflection of meter. (5) Adjust oscillator

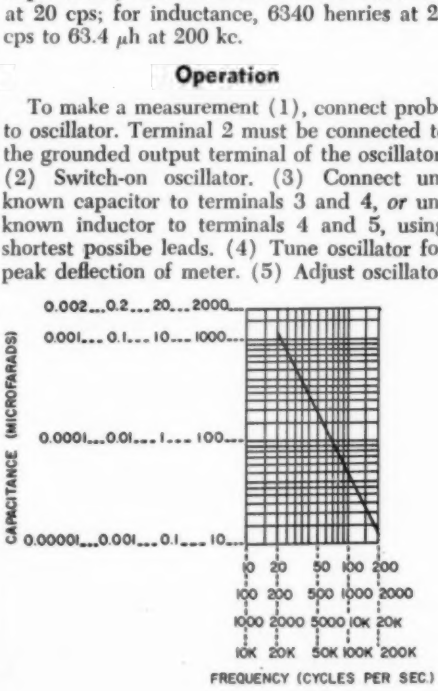

FIGURE 6

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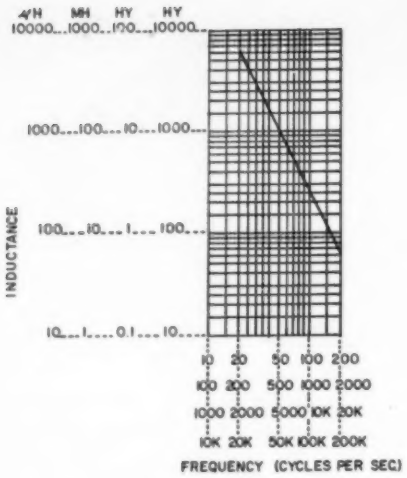


FIGURE 7

output to bring deflection in upper portion of meter scale. (6) Read resonant frequency, f, from oscillator dial. (7) For maximum accuracy, *calculate* $C=506{,}600/f^2$, or $L=2{,}530{,}000/f^2$ (in each case C is in mfd, L in hy, and f in cps).

For faster but somewhat less accurate determination of C or L from frequency, involving no calculations, use one of the following methods:

Charts. Use the Capacitance Chart (Fig. 6) or Inductance Chart (Fig. 7) given in this article.

Reactance Slide Rule. For capacitance, (1) set the slide to the resonant frequency, (2) On the capacitance scale, read the capacitance value that is lined up with 50 mh on the inductance scale. For inductance, (1) set the slide to the resonant frequency. (2) On the inductance scale, read the inductance value that is lined up with 0.01 mfd on the capacitance scale. . . . K6AI

Surplus Crystal Calibrator

Roy E. Pafenberg W4WKM
316 Stratford Avenue
Fairfax, Virginia

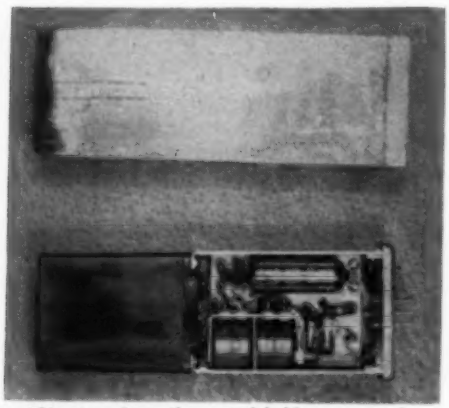
Photography by Morgan S. Gassman, Jr.

MILITARY SURPLUS electronic gear falls in the three major categories of end equipments, sub-assemblies and components. As far as the amateur is concerned, the utility of available items in all categories ranges from the so called "boat anchors" to the real bargains.

One particularly desirable sub-assembly is

This compact little calibration oscillator plugs into a standard 7 pin tube socket.

the 500 kc crystal calibrator used in the AN/ARC-21 Aircraft Radio Set. This hermetically sealed unit is available in quantity from Barry Electronics[1] and is a real bargain at $3.75 plus postage. As shown in the photographs, the complete calibrator is housed in a compact, nickel plated brass case measuring 4¼" x 1-7/16" x 1⅛". These dimensions are exclusive of the connector which plugs into a standard 7 pin miniatude tube socket.



This view shows the crystal holder-oven at the top of the unit. The pot core inductors and the sub-miniature tube are also visible.

The circuit, shown in Fig. 1, uses a type 5840 sub-miniature tube. The crystal is housed in an oven-type holder. This oven, which requires a 28 volt ac or dc supply, may or may not be used, depending on the order of stability required. The oscillator requires a 6.3 volt ac or dc heater supply and 75 to 100 volts B+ for the plate and screen supply. With the crystal oven used and with a regulated B+

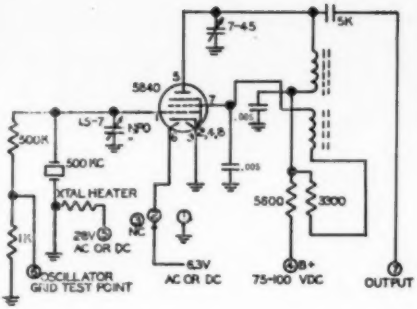


FIG. 1

voltage of 75 volts, stability of the oscillator is ±.0012%. This is fully adequate for most applications.

This unit is ideally suited for use as a receiver calibrator or band edge maker. Simply apply the recommended operating voltages and couple the output to the receiver antenna. An insulated lead connected to Pin 1 of the unit with a couple of turns wrapped around the antenna lead will provide sufficient coupling.

. . . W4WKM

[1]Barry Electronics Corporation, 512 Broadway, New York 12, New York

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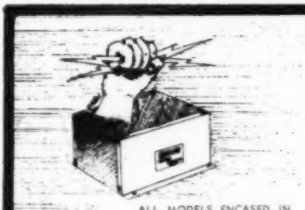

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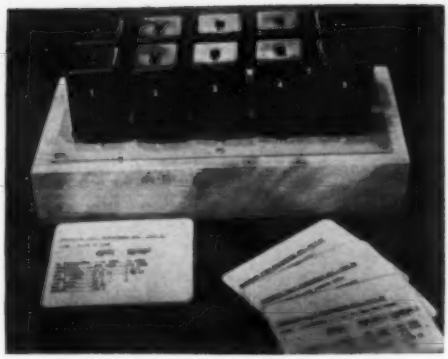


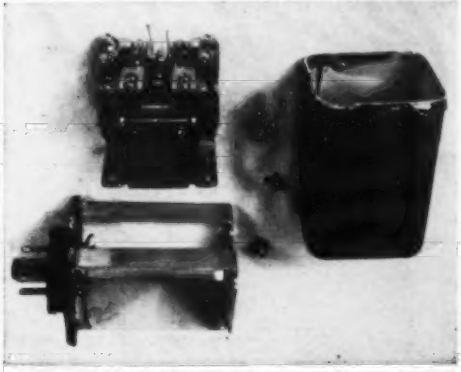
This test transformer set is an example of the use that can be made of surplus relay cans.

Use of Surplus Plug-in Cans in Amateur Construction

Roy E. Pafenberg

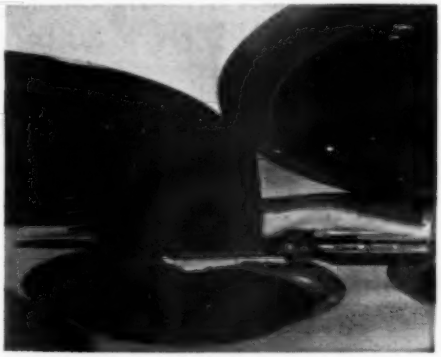
Photography: Jim Gardner

A search of any hams junk box will usually disclose a large number of hermetically sealed, plug-in relays which had been purchased at a time when their highly improbable operating voltage or current requirements were obscured by equally improbably low price tags. The same considerations that led to the use of the pluck-out components in the original equipment apply equally to amateur construction. In addition, use of plug-in sub-assemblies make construction easier and permits changes to be made without destroying the appearance of the finished project.



The unusable relays are easily removed from the can, leaving it ready for cleaning and installation of other components.

Surplus relay cans are ideal for many applications and, in addition to the above cited advantages, provide excellent shielding of critical circuits. Unsoldering the hermetically sealed cans with usually available soldering irons is a difficult task. An ordinary electric hot plate or range burner makes a snap of the job. Turn the hot plate to high heat and place the bottom solder seal of the case on the edge of the heating element. Using gloves or hot pads, turn the relay can to insure uniform heating. As soon as the solder flows, pull the assembly apart. Flick the base to remove excess solder. Place the empty cover back on the



An ordinary electric hot plate or range element does an excellent job of opening those hermetically sealed surplus components.

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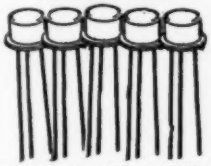

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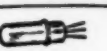

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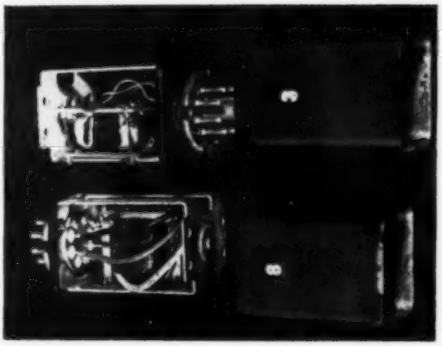

Close-up view of representative assemblies shows possible mounting methods.

hot plate. Paint, if used will scorch off and, when the tin flows smoothly, drop on a hard surface to remove the debris. Remove the relay from the base, clean up the parts and a custom enclosure results. The photographs show the various steps of the procedure and the complete job requires only a few minutes.

The photographs show the method of mounting components in the can and a finished product using this technique. An added bonus is that many relays, once available for adjustment, may be made usable for amateur applications.

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Saga of the Bookshop

HAVING JUST MOVED the Radio Bookshop up to our New Hampshire headquarters building, it seemed to me that some of the over 5000 hams who have bought books from Bookshop might be interested in how such a thing came about in the first place and how it was run.

By way of establishing chronology, it was in January 1955 that I left the hi-fi manufacturing business and stepped in as editor of CQ. By mid-1956 the emergencies with CQ were pretty well solved and the magazine was prospering. At that time it struck me that there should be some sort of book service for amateurs which would make it easy for them to buy radio books which would help them learn more about their hobby. I felt that a hamshack was only as good as the reference library in it and that the ready availability of good reference books might be a good thing.

Cowan, CQ's publisher, didn't think that he wanted to get involved in such a thing. I kept after him about it and finally offered to run it myself if CQ would make advertising space available for it. The first ad ran in the May 1957 issue of CQ . . . a half page ad for three books. Three lonely little orders dribbled in. I can imagine how some manufacturers feel when they spend $200 on a half page ad for what they believe is a good product and then they get two or three orders. I knew that continued (Never Say Die) advertising would do the trick so I kept after it.

By the end of 1957 the orders were coming in every day and it was getting to be more than I could handle. My mother had gotten used to filling the orders whenever I went away to conventions so it wasn't difficult to sort of gradually let her take over completely. She really enjoyed the work and she threw herself completely into it. No book was too hard to find for a customer . . . she would spend days calling local publishers and writing the more distant publishers to find an obscure book that a fellow had written in about. Every order had to go out the day it came in or else she would be miserable. She loved getting letters from customers and particularly enjoyed the rather large foreign business that developed.

The day CQ and I got fed up with each other she was distraught . . . what was going to happen to Bookshop? CQ immediately cancelled the ads and I got a distinct impression that they wouldn't even take them for money. I tried to buy space in QST, but they wouldn't accept any ads, even through an advertising agency. Frustration. Bookshop hibernated. Mother fretted.

When I went to work to start 73 she was delighted . . . Bookshop would be alive again. Since she had never taken any of the profits out of the Bookshop bank account I was able to dip into this to help get 73 started. It helped a lot. As 73 got into publication the Bookshop quickly revived and mother was happily submerged in the problems of getting deliveries from publishers, keeping all other necessary supplies on hand, keeping records, and sending out books.

This summer, when we moved 73 to New Hampshire, there was no possibility of bringing Bookshop along for mother was devoting what time she didn't give to her mother, who was in poor shape after a stroke, to running it and it was helping to keep her busy during this time of emotional stress. When her mother died in December this freed my mother and father so they could plan a trip or two, except for the responsibility of Bookshop. It was a painful decision to make, but after five years of running the Bookshop and sending out some 15,000 books, my mother turned the records and shelves of books kept in stock over to me and we have now set up business in our 73 headquarters building in Peterborough. Mother, known to hundreds and hundreds of Bookshop correspondents as Cleo Willson, wants to thank every one of you that have sent in orders to the Bookshop and to let you know that she enjoyed serving you more than she can express.

We'll carry on with the Bookshop. I'll probably be doing a lot of the work now, helped by Virginia. I hope you'll take a good critical look at your reference shelf and think about adding a good book to it every now and then.

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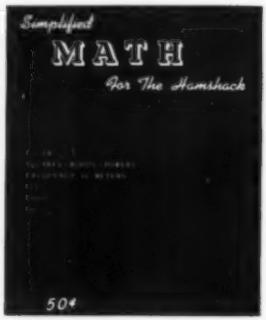

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If you have any ham gear circa the mid or early thirties please make arrangements so it won't be junked when you leave us. We'd sure like to have it for display in the museum here with your QSL on it.

Globe and Subscription: $16.95

If you shop around carefully in other ham magazines you may be able to find this very same globe with no subscription bonus being sold for a paltry $19.95. When you think it over carefully I am sure that you will see their point and order a globe from them for it certainly is worth that three dollars extra not to have another year of 73 to worry about.

In case I have not been as persuasive as usual and you still insist on ordering this terrific 18" diameter (nearly five feet around the equator) world globe and the one year subscription or renewal that goes with it whether you like it or not (unless you are a life subscriber in which case drop us a line for your special deal which I daren't publish for fear of starting a rush for life subscriptions). These plastic balloons are guaranteed, so don't grumble about what happens when it gets old. I have two of them that have been kicking around for over seven years now and they are still going strong. Use them all the time. Deflate 'em when going to hamfests or moving. Just jot your name, address, call, new or renewal sub (give expiration date if you know it), and bundle this up with cash, check or money order (U. S. or Canadian) and send it to us: 73, Peterborough, N. H.

INDEX TO SURPLUS

Here, all in one book, is a list of every piece of surplus equipment that has ever been discussed or converted in a magazine article in any of the radio magazines. The Index lists the equipment, the title, author and issue of magazine where the conversion was published, plus a brief description of the conversion accomplished. Just one single use of this book will be worth several times the **$1.50** price to you. Compiled with painstaking care by Roy Pafenberg W4WKM.

73 Parts Kits

Wayne W2NSD/1

Obviously everyone doesn't have the surplus store size junk box that I have accrued over some twenty plus years in ham radio. To make things easier for the fellow with the restricted junk box we're starting a new service this month: parts kits for our construction projects. From now on, if this idea works out well, we'll have a kit of the basic parts availabe for all of our simpler construction articles. I figure that quantity buying of parts should make it possible to sell parts kits at a little below the regular net prices of the parts (besides the simplicity of getting just exactly the parts required for a project all at once without having to fight your way through several catalogs) and still have it pay for someone to do the purchasing and put the kits together.

These will be kits of parts, not the Heath-type affair with detailed instructions, chassis, etc. Commercial chassis run the prices up on things and greatly complicate packing and shipping, so we'll figure that you will have your own chassis or can make do with an old one, a piece of heavy cardboard, cake pan, etc.

The first of the kits are now available for immediate shipment.

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AMATEUR TELEVISION

A great many fellows are missing out on the fabulous bi-monthly ATV Bulletin edited by Mel Shadbolt WØKYQ. A subscription to this Bulletin is only $1 per year . . . and five issues have already been published. We still have a few back issues available for those that send in immediately. What is in the Bulletin? In addition to news of amateur TV activities all over the country (and elsewhere) there is a directory of all interested hams, a discussion of available surplus and other new or used equipment, etc. To give you a little more detail, here is a list of the features in each of the first five issues:

I UHF Antenna Connector; Source of used Vidicons; Photomultiplier tubes from junk auto dimmers; Linearity test method; ATK with slide projector; 5FP5 tube good for FSS Camera; Test pattern; TV Directory.

II Cheaper Vidicons; ID-66/AXR-1 description, photos, complete schematic, conversion; Converting UHF TV tuners for ATV; That DC Component.

III Slide Camera in a jiffy; 420 mc ATV Antenna; One mc TV proposal; The Camera Lens; Television Standards; Monoscopes; Lecher lines.

IV Twenty pages this time. Image orthicon; Peaking coils; Negative feedback amplifiers; Flying spot scanners; Selection of tubes for video amplifiers.

V Twenty pages again. Complete copy of petition to FCC for ATV experimentation on two and six meters; Gamma; A Monoscope Camera; Don't Be Afraid To Be First; Inexpensive Optics for Flying Spot Scanners; Modification of commercial UHF Converters on the ATV Band; Power supply modification for the Bill Parker Camera; More on the TV Camera; Standardization.

The material in the ATV Bulletins is mostly in the form of articles submitted by interested and active amateurs. Send your dollar right now and don't miss any more issues. Please let us know if you want your subscription to start with the first issue or with the current issue. It might be a good idea to send $2 by now since we have five issues out as this will get you the complete set of back issues plus the next seven issues to come. Don't forget to give your call and address when ordering.

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(W2NSD from page 6)

head is dug into the sand. The ACARN-ARAN-NRRL approach to deficiencies in our own government is about the same . . . when you disagree with governmental actions take matters into your own hands.

Amateur radio represents one of the few mediums for people-to-people communication with the communist world. Few of our magazines are able to get through, few movies, few books. Those few tourists that manage to get behind the iron curtain find themselves hamstrung by the everwatchful Intourist guides and the language barrier. There is no question in my mind that there is a basic struggle going on between communism and democracy and that this is a serious backstage battle. I am indeed unhappy over their victories, many of which seem awfully avoidable. But I think one of the stupidest things we could possibly do would be to cut off the amateur radio contacts with the socialist countries for these contacts cannot do us any harm and can do great harm to them. Time would seem to be in the favor of peace for with every year we find the Soviets moving closer to capitalism and the U. S. moving two steps toward socialism. Will we meet in the middle somewhere or just pass each other going our separate ways.

The NRRL-ACARN proposal to represent the amateurs before Congress, FCC, etc., is the best laugh of all. The FCC regulations do not permit any group to "represent" the amateurs. Under the present setup each amateur represents himself as far as the FCC is concerned and any groups, clubs, etc., are permitted to file comments on the same basis as individual amateurs. I do feel that amateur radio would benefit from some lobby pressure in Washington and have been a bit at odds with the ARRL over their refusal to set anything of this nature up. I think it would be a catastrophe for amateur radio if the NRRL were to step into this void.

All this business got me to thinking about the overall amateur radio setup that we have. The socialistic trend that we have been following of leaning more and more on the Federal Government and doing less and less for ourselves bothers me. We could, through the

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ARRL, take over most of the responsibility for our hobby and run it ourselves.

Suppose a Director were elected in each call area whose responsibility was to administer his area. He would receive a salary for his work and would organize the licensing and delicensing in his area. He would then have an assistant in each major radio club who would be in charge of administering license exams and checking out complaints of infractions of the rules. Official Observers would send duplicates of infraction reports to offenders and to the Director. When such reports indicate multiple offenses by an amateur a hearing could be held on the club level and a report of the findings sent to the Director for appropriate action.

At a yearly convention the Directors and all interested amateurs could get together and discuss proposed changes in the regulations and allocations. The Directors could then poll themselves for a final decision on rule changes.

This arrangement would make our hobby a lot more flexible and permit more direct participation in the management by the individual amateurs. It would cut down tremendously on the expense to the FCC for the administration of the amateur program. It would enable us to have supervised exams for all classes of license at no government cost. It would cut down tremendously on the necessity for FCC monitoring of the amateur bands since this would be taken care of by the Official Observers.

Naturally a program like this would increase the costs of running the League, but I think we can well afford a bit higher investment when it would bring us so many benefits. Right now I am paying $15 a year in dues to the Sports Car Club of America, and $12 per year to the Porsche Club of America. I do not figure that either of these are high for the benefits that I get and I would not think $15 a year for the ARRL would be exorbitant if it were to really manage the hobby. This would certainly make generous funds available for the area Director and his administration expenses.

This is all just a thought that occurred to me and I am sure that anyone can poke all sorts of holes in it with little effort. I would rather see ideas to make something like this possible than a list of the reasons why it couldn't work. I'm that way . . . I try to figure out how to do things instead of why they can't be done. Maybe that's why I've been able to successfully start our new little magazine in competition with multimillion dollar

(Turn to page 78)

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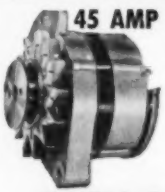

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(W2NSD from page 77)

QST and a large commercial New York publishing house (CQ).

You & Him Fight

The editorial in the February issue of QST didn't upset me much, but it did get me to thinking a bit. Judging from some of the letters I've received this was not a universal reaction. I don't know why people insist on coming to me when they are upset and not thinking, but somehow, in spite of everything I have written to the contrary for the last twelve years, a few fellows have it stuck firmly in their mind that I'm anti-ARRL. Ho, hum.

Briefly, whoever writes the unsigned editorials in QST suggested that we return to the old Class A system of license privileges. This would mean taking away certain phone bands from the General and Conditional Class licensees. The purpose of this is to return to incentive licensing which is supposed to increase the general level of technical knowledge and improve the quality of signals on our bands.

Now I'm for technical knowledge and I'm all for anything that will increase it, but I sure doubt that making a lot of fellows memorize a lot of true-false questions will increase our knowledge much and I'm even more con-

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Yes you can. A subscription to 73 will not only buy you the friendship of the editor, but will go a long way toward securing an even more precious possession: friendship with yourself. Don't go around like a lot of people, snarling at things and kicking the dog when he gets in the way. When you get that monthly reminder of self friendship from 73 you will think twice before you start belting the kids around. You will also get a chance to read the rather good section we are running in April on sideband transceivers.

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vinced that it will not improve the quality of the commercial equipment being produced so that we will have better signals on the bands. It would, however, make a hundred thousand or so General licensee hams furious, sell a fantastic number of license manuals, and probably trim League membership by aforesaid hundred thousand.

Is this the best way to go about achieving the desired results? If technical knowledge is the goal why try to legislate it when you can encourage it through peaceful means with a series of technical achievement certificates? The Institute plans to eventually do this unless the ARRL steps in and sets up the program first, which would be welcome. It seems to me that my scheme of printing as many simplified technical articles and simple construction projects as I can get written will help steer us all in the right direction.

Much of the QRM on the bands, which I am sure has a lot to do with the whole project (even though it was implicit) could be alleviated by enlisting the cooperation of everyone to become active on more bands and thus spread things out more. It is not that all of our bands are crowded, only that parts of some of them are jammed.

Reciprocation Again

Senator Goldwater has given us a second chance to put our shoulder to the grindstone by reintroducing the bill for permitting the FCC to extend licensing privileges to visiting foreign hams, should they believe it worthwhile. Now, if we could find one single amateur with a few weeks spare time and the perseverance to personally talk this piece of legislation through all of the bureaucracy which is stacked up against it, we might end up with a badly needed change in the old 1934 Communications Act and we might be able to face the foreign amateurs at the next Geneva Conference (on frequency allocations) and find them more friendly. We might also be able to operate from a lot more countries while traveling.

Conventional Conventions

The recent failure of the Hudson Convention to draw more than a handful of amateurs seems to me to be far more than the result of inept planning and bumbling chairmanship. The alibi that the International Communications Fair a few weeks later, so heavily publicized by CQ, drew away amateurs from the Hudson Convention doesn't hold much water when one considers that this too turned out to be a monumental turkey.

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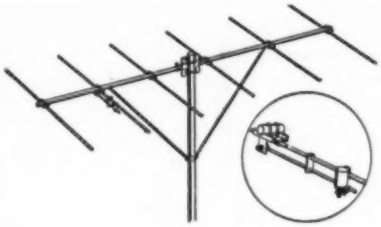

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What's wrong?

After having attended twenty-odd conventions and participated rather intimately in the staging of one, I think I have some ideas. I am not thinking so much in terms of slight improvements as in basic orientation. All of the suggestions that I made in my November 1961 editorial are still valid and have since been backed up over and over by letters from experienced convention committees, but those ideas aren't basic enough.

What is the purpose of a convention? A long list of purposes can be worked up if you set a committee on the project, but basically it is to get a bunch of hams together and have a good time. OK? And what do conventions offer hams in the way of a good time? Well, they offer a chance to meet other hams and talk. This is fine if you are fairly active and have a group of fellows that you pal around with on the air. In reality it is often difficult to find people to talk to and you usually stick with one or two friends for the whole affair.

There are prizes. I suppose that a few fellows will go to all the trouble to go to a convention, complete with entrance fee, in the hope of winning something great. I have watched too many kilowatt stations being won by the wives of Novices to put much faith in any riches coming my way. With the exception of the Dayton Hamvention most conventions send the great percentage of the conventioneers home empty handed.

There are exhibits. These are popular and are more the crux of conventions than any other facet. The high cost of booths and exhibiting keep down the number of exhibits. Conventioneers spend a great deal of their time at the exhibits, not so much out of interest, but for the lack of anything else to do.

Talks by experts are a feature of most conventions. Some of these are interesting, some are incredibly dull. I've dozed through some interminable talks by top names in our hobby. And some, like the VHF talk by Bruce Kelly W2ICE, stand out for years in my memory.

Something important is lacking. Consider the convention from the aspect of the ham who is trying to decide whether he wants to take a day or two off, spend the $5 entrance fee, and drive all the way to the convention. If he has to foot the bill for the XYL plus hotel then it has to be mighty attractive to him. Even in New York City, where most fellows only have to spend 15¢ plus a short subway ride to attend a convention, more than nine out of ten amateurs stayed home.

Here is my suggestion. Instead of inviting a few well known hams to pontificate, why

not have them conduct seminars for the discussion of all aspects of their specialization. In this way fellows interested in RTTY could get together and talk over new circuits, operating techniques, the solution to mutual problems, etc. The VHF'ers could exchange ideas on allocations, techniques for working and detecting aurora, meteor skip, etc. Group discussions could be conducted on every aspect of our hobby and the attending amateurs could actually participate in the talks rather than having to be just passive listeners, with the privilege of throwing a question or two at the end if there is time.

It seems to me that a lot more enthusiasm for attending conventions might be in evidence if everyone could actively participate like this. I suspect that we would see a lot of fellows carting in their latest homebrew gear to show, their QSL cards to flash, notes on subjects they want to bring up in the various seminars, and a lot of enthusiasm.

Yes, yes, I know . . . there have been seminars at conventions . . . nothing new in the idea. Well, I'm more conservative than liberal, and this means that I am more for the utilization of proven ideas than for the experimentation with untried ones. If our little Institute of Amateur Radio ever grows to the convention stage we'll seminar things to a fare-thee-well (whatever that is).

Quack

The SSBARA will have their usual "Dinner"

(Turn to page 88)

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CW Sidetone for SSB Rigs

Shel Shallon K6CYG
11058 Queensland Street
Los Angeles 34, Calif.

MY STORE-BOUGHT SSB rig also does a fine job as a CW transmitter. For CW operation, audio drive to the balanced modulator is disabled, and carrier signal is injected downstream of the balanced modulator. However, the rig does not have a built-in sidetone oscillator as do some of the other rigs on the market. No doubt, the absence of a sidetone oscillator reduced the price of the rig a few dollars from what it might otherwise have been, but the operation convenience is also reduced:

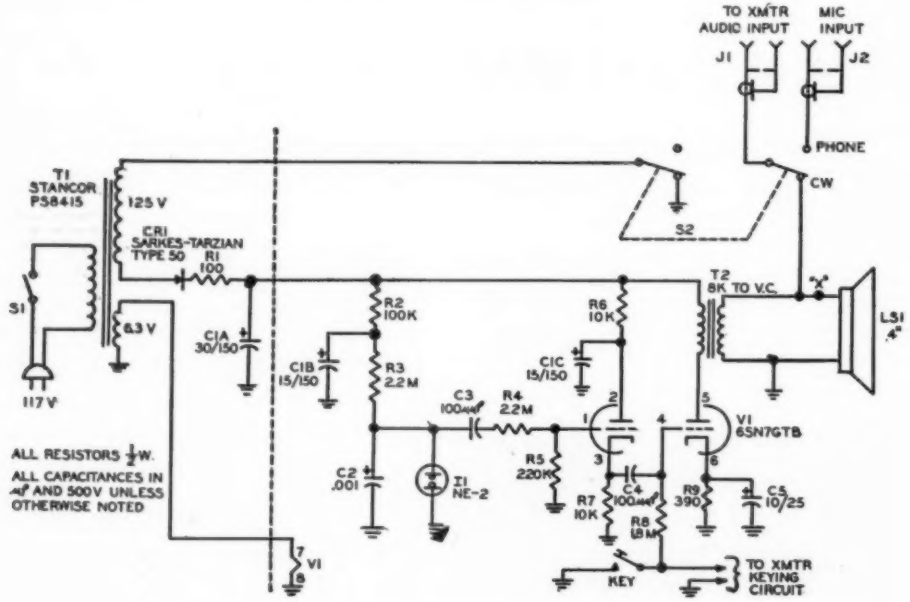
(1) with no sidetone there is no convenient way to monitor my fist when working stations off my own frequency; and
(2) a sidetone audio signal can be used to actuate the transmitter VOX circuit, eliminating the need for a manual send-receive switch.

I decided to add the sidetone oscillator that the manufacturer left out. The resulting unit, built completely from parts in my junkbox, is external to the transmitter and requires absolutely no modification of the transmitter.

The accompanying schematic tells practically the whole story.

The oscillator, consisting of R3, C2, and the NE-2 neon bulb, is about as simple as an oscillator can be. This type of oscillator is especially well suited to this application because the sawtooth waveform that it produces is easier to listen to for extended periods than a sinusoidal waveform. Increasing the value of R3 or C2, or decreasing the supply voltage, will decrease the oscillator frequency; decreasing the value of R3 or C2, or increasing the supply voltage, will increase the oscillator frequency. If you decrease R3 to too low a value, oscillation will stop.

One half of V1 is a cathode-follower; the second half is a keyed audio amplifier with a speaker output transformer as its plate load. The cathode-follower was found necessary to isolate the oscillator from the keying transients at the grid of the amplifier section; without the cathode-follower, the oscillator stopped and



started with each dot and dash.

The two resistors connected to the grid of the cathode-follower comprise an attenuator to set the speaker volume at the desired level. If you want to change the speaker volume, increase or decrease R5, as appropriate.

The bottom end of the amplifier grid resistor, R8, connects to the hot terminal of the key. Your xmtr must use a grid-block keying system in which a negative voltage sufficient to cut off the amplifier portion of V1 exists across the key when the key is open. Closing the key grounds the grid resistor, allowing the tube to amplify; this results in a monitoring tone from the speaker, and actuates the xmtr VOX circuit on the first "dit". The VOX will drop out after the normal delay time when you stop sending.

The power supply is shown to the left of the dashed line in the schematic. I found it more convenient to build in the power supply as part of the sidetone oscillator unit, but you may prefer to steal some current from your rig or receiver, or use another source of power. If you do, plate supply voltages between 90 and 250 volts should work satisfactorily. At 90 volts, the current drain is 6 ma; the current drain will be approximately proportional to the supply voltage. Make certain that the electrolytic capacitors C1B and C1C have sufficient voltage rating to handle whatever supply voltage you use.

The power transformer I used is GE No. K68J661. It comes from a reluctance pickup phono preamplifier. The transformer shown in the schematic is the closest substitute I was able to locate in the catalogs.

There is nothing particularly critical about any of the component values. Cathode by-pass capacitor C5 can have any value from 6 to 25 uf. Resistor values and the values of C3 and C4 can vary 20% from those indicated. The primary impedance of T2 should be between 6000 ohms and 10,000 ohms.

My sidetone oscillator is built on an old chassis (also from the phono preamp) that is not particularly a thing of beauty. Not only is it unworthy of a photograph; but it doesn't even look good in my shack, so I have it mounted under the operating table where it is also out of the way.

One additional note. The zeroing switch on my rig grounds the keying circuit. To avoid sidetone from the speaker when zeroing, I placed a normally-open unused auxiliary contact on my antenna relay in series with the speaker at point "X" on the schematic. This allows sidetone to reach the speaker only when the VOX is activated and the rig is on the air.

. . . K6CYG

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CORRECTION!

My ad last month should have read "3BP-1 . . . . $3.95," not $2.75 as it did read.

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0-5 MA DC, EMICO NF2C2125, 2" rd. moving vane $1.50

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Donald Smith W3UZN
Associate Editor
Kent Mitchell W3WTO

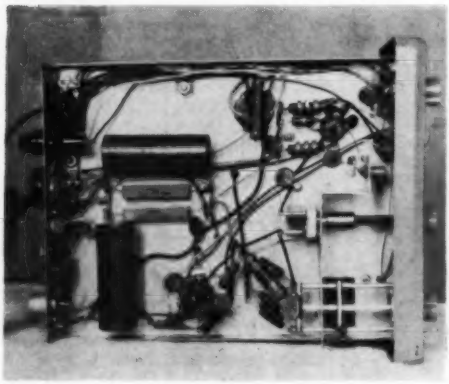
73 Tests the

Eico 723

THE EICO PEOPLE have brought out a transmitter which is obviously intended for the Novice, though any amateur would be happy to own it for a standby rig. Economy, ease of construction, and simple operation are among its virtues. Priced at $49.95 in kit form and providing 60 watts CW input on 80, 40, 20, 15 and 10 meters, the rig also has provisions for an external VFO and a modulator when the Novice ticket is exchanged for a General.

The rig has three tubes; a 6CL6 oscillator, a 6DQ6B final amplifier (each of these stages has its own bandswitching plate tank circuit), and a GZ34 rectifier in the power supply. A complete diagram of the 723 is shown in Fig. 1.

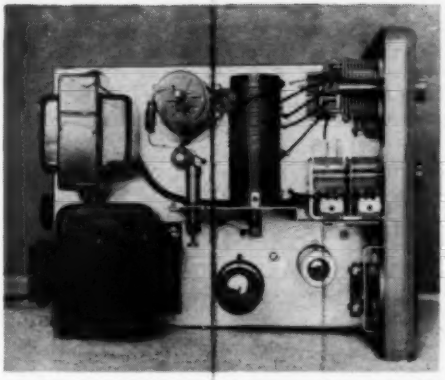
The 6CL6 functions as a Colpitts crystal controlled oscillator. There are two inherent characteristics of this circuit which make it very desirable. First, very little current actually flows through the crystal, thereby reducing the possibility of crystal heating. This greatly reduces any tendency for the crystal to change its resonant frequency. This also eliminates the possibility of the crystal being fractured by excessive current.



Secondly, and most important in a rig of this type, the circuit provides relatively high output at multiples of the crystal frequency and it can be tuned to the desired harmonic by the plate tank circuit. This eliminates the necessity of an additional tube for a buffer-doubler. It also allows the use of 80 meter crystals for 80, 40 and 20 meter operation, while 40 meter crystals may be used on any band, 40 through 10 meters.

Although there is no buffer stage between the oscillator and the final amplifier, frequency shift due to oscillator loading is minimized because the frequency determining portions of the oscillator circuit (the crystal and control grid) are isolated from the oscillator plate tank circuit by the screen grid.

The final amplifier is quite conventional, with the 6DQ6B pentode operating as a class C power amplifier. The final operates straight through on all bands, with the exception of 10 meters, where it functions as a frequency doubler-final. A band-switching pi-network tank circuit serves to match the final to the antenna. Loads of 50 to 1000 ohms may be matched by this circuit. A somewhat unusual feature is an additional 1000 mmfd capacitor



which may be switched in parallel with the 900 mmfd variable used in the pi-network, if proper loading is not possible with a particular type of antenna at the lower frequencies.

Cathode keying is used in the 723, with both the oscillator and the final being keyed. An octal plug on the rear chassis apron permits an external modulator, such as an EICO Model 730, to be placed in series with the final amplifier B+ line. With this arrangement, 50 watts input may be expected on AM phone.

An external VFO may be used by simply plugging its output into the crystal socket on the front panel of the rig. In the event that the VFO does not have a self-contained power supply, Eico has conveniently provided 500 vdc at up to 15 ma and 6.3 vac at the octal socket on the rear chassis apron.

The power supply utilizes a GZ34 rectifier tube, sometimes called a 5AR4, and a 5-25 Henry swinging choke, along with two 40 mfd capacitors. This circuit does a good filtering job and provides good regulation on CW. In the event of ac power failure, the octal plug may be connected to an external emergency power supply, such as a mobile battery operated vibrator supply (see Oct. 1960 issue of 73 Magazine for a delux "Three-way Power

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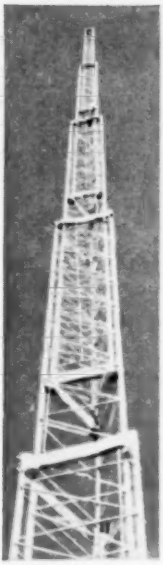

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Supply"). Even if the emergency supply does not put out the maximum amount of 500 vdc @ 150 ma, the rig could still be used on an emergency basis at reduced power.

Another feature is that 117 vac is automatically applied to pins 2 and 7 of the rear socket when the Function switch is placed in the "XMIT" position. This voltage can be used to operate an antenna change-over relay and other devices.

Construction of the kit proceeded without difficulty and no mistakes were found in the instructions. The 160 steps, which sound like a great deal, were easy to follow and were assisted by large, clear fold-outs. Total time required for assembly will run from about 14 to 20 hours, depending on kit building experience. In spite of the relatively small overall size, the under chassis wiring is not at all crowded and should be no problem to someone constructing his first transmitter.

Three amateurs used the rig, each under different conditions and with various types of antennas. Results were as good or better then expected. Most who have used this little rig were surprised at the way it "got out." The cabinet design also is impressive, particularly when you consider the low price. At $49.95 the little 723 is a good buy for the Novice or others who want a good standby rig.

. . . W3UZN-W3WTO

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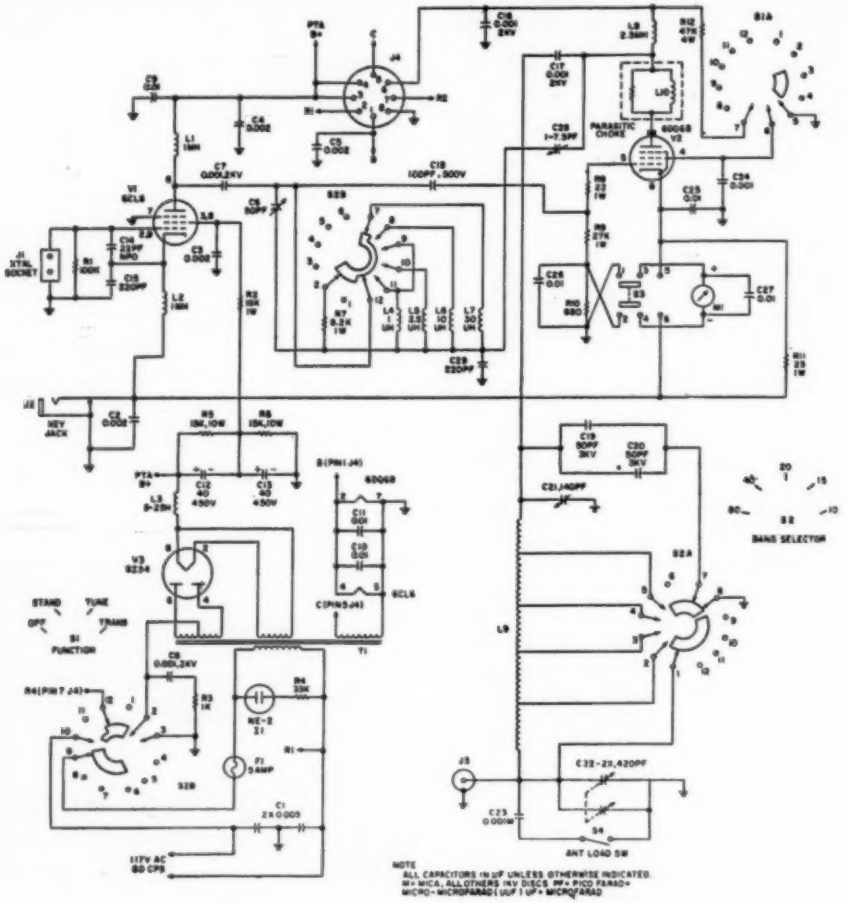
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MICRO= MICROFARAD (1/UF = 1 UF = MICROFARAD

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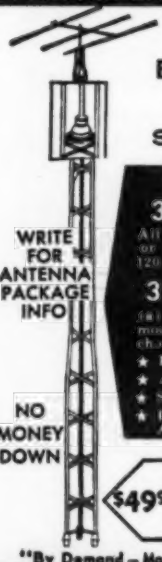

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(W2NSD from page 81)

at the Statler-Hilton, an all day hamfest on March 26th. Exhibits, etc. The dinner will run you $12.50 if you order tickets in advance from W2JKN, 4665 Iselin Ave., New York 71. $13.50 at the door. Steak dinner, professional entertainment.

Ritty Eaters

In addition to the other festivities going on at the IRE Show this year there will be the usual gathering of the RTTY clan at the White Turkey Town House, 260 Madison Avenue, New York, at 7 PM, Monday March 25th. The Tab is $6 paid in advance to Elston Swanson W2PEE, Instruments for Industry, 101 New South Road, Hicksville, New York. I'll be there . . . see you.

C W Abbreviations

For many years I've nursed an irritation over the abbreviations used by hams, most of them sponsored by an organization that should know better. I'd like to get my thoughts on the subject over to the gang, through our new and rising magazine 73.

Since 1879 the Phillips Code has been available as a standard of abbreviations suited for the transmission of news over press landline and radio circuits. Amateurs would do well to adopt this code as a standard of abbreviations. It will make a CW rag chew more enjoyable, and permit a great deal more ground to be covered in a given time. While the code was tailored to news stories, it is ideal for ham usage as well. Let's cite just a few examples: IWU—it was understood; QOH—on the other hand; ENY—enthusiastically; YA – yesterday; YAM – yesterday morning; ELCUD—electrocuted (as some hams are), and it is hoped that they are CBI—covered by insurance, and that their shack isn't DBF—destroyed by fire. There are hundreds more. And the code has an added advantage. It is easier to remember a short abbreviation such as PNPY than to remember how to spell plenipotentiary.

The TCR edition (Telegraph-Cable-Radio) of Phillips Code, is available from the Telegraph and Telephone Age, 25 Beaver Street, New York 4, N. Y. It contains, in addition to the Phillips Code, the various "Q" codes and their commercial equivalent the "Z" codes. In the back of the book are the International and Morse codes, World Time charts, and several foreign alphabets with their code symbols.

After you get your code book, meet me on the air. I used to be a press operator and my speed is a leisurely 55 wpm if your keying is clean and you know how to use your keyer. And, I still remember a good part of Phillips Code. . . . K7MSL

Institute Certificates

CERTIFICATE HATERS CLUB. Available to any licensed amateur who submits a signed statement that he has never been awarded any other certificates and that is, in the future, he is ever awarded another certificate that he will hate it. One dollar required to cover the costs of administration of this program.

WAAS CERTIFICATE. Available to licensed amateurs who submit proof of having contacted 49 states and a dollar to cover the costs of administration of the program. QSL's must be alphabetical by state. Stickers ($1 per application) are available for WAAS made all on any one band or all with one mode of emission (CW-AM-SSB-RTTY).

DXDC CERTIFICATE. DX Decade Club. Available to amateurs who submit proof of contact with any ten official U. N. countries and a dollar to cover costs of administration of the program. Stickers ($1 each) are available for DXDC made all on one band or all with one mode.

RRCC. Real Rag-Chewers Club. Submit signed statement confirming a two-way continuous six hour contact and dollar to cover our costs.

For a Full Time organization calling on the amateur trade, contact Ivan Harrison W5HBE, P. O. Box 30241, Dallas 30, Texas. Texas, Arkansas, Louisiana and Oklahoma.

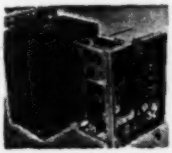
FREQUENCY-METER BARGAINS

Navy LM, .125-20 mc w/matching book, xtl, schematic, instruct., 100% grid $59.50
AC Pwr for LM: Modify new EAO, w/LM plug, silicon diodes, instructions we furnish $9.95
BC-221: Less modulation, 100% OK grid ..... $ 69.50
TS-173 w/AC pwr sply, 90-450 mc, .005% $150.00
TS-174, 20-280 mc, .01% $150.00
TS-323, 20-450 mc, .005/.002% $275.00
TS-186, 0.1-10 KMC, .01%, xtl calib $295.00

ARC-3 and ART-13A TECH MANUALS!

Handbooks mainten., oper., theory, schem. dwgs, etc. Either book postpaid $10.00

2-METER RECEIVER & 2/6/10 METER XMTR



SCR-522 rcvr, xmtr, rack & case, exc. cond. 19 tubes included 832A's. 100-156 mc AM. Satisfaction grtd. Sold at less than the tube cost in surplus. Shpg wt 85 lbs. Fob Bremerton, Wash. Only **$14.95**

Add $3.00 for complete technical data group including original schematics & parts lists, IF, xtl formulas, instruct. for AC pwr sply, for rcvr continuous tuning, for xmtr 2-meter use, & for putting xmtr on 6 & 10 meters.

COMMUNICATIONS RECEIVER BARGAINS

BC453B: 190-550 kc 6-tube superhet w/85 kc IF's, ideal as long-wave rcvr, as tunable IF & as 2nd convert. W/all data. CHECKED ELECTRICALLY Grtd. OK! 11 lbs. fob Los Angeles $12.95

Same, in handsome cabinet w/pwr sply, spkr, etc., ready to use, is our GX-535, 19 lbs. $37.50

RBS: Navy's pride 2-20 mc 14-tube superhet has voice filter for low noise, ear-saving AGC, high sens. & select. IF is 1255 kc. Checked, aligned, w/pwr sply, cords, tech data, ready to use, fob Charleston, S. C. or Los Angeles $79.50

R-45/ARR-7 brand new, 12-tube superhet .55-43 mc in 6 bands, S-meter, 455 kc IF's, xtl filter, 6 sel. positions, etc. Hot and complete, it can be made still better by double-converting into the BC-453 or GX-535. Pwr sply includes DC for the automatic tuning motor. Fob San Antonio $179.50

Time Pay Plan: $17.95 down. 11 x $18.03

RADIO RECEIVER AND/OR SPECTRUM STUDIES

R-54/APR-4 rcvr is the 11-tube 30 mc IF etc. for the plug-in tuning units; has S-meter, 60 cy pwr sply. Pan. Video & Audio outputs. AM. Checked, aligned, with heads for 38-1000 mc, pwr plug & Handbook, fob Los Angeles $164.00
(Add $30.00 for 60 cy AM/FM instead of AM.)

Write stating your specific needs in lab-type test equipment: Scopes, Signal Generators, freq. meters, etc., etc.

R. E. GOODHEART CO., INC.
Box 1220-GC BEVERLY HILLS, CALIF.

for CHOKES see
HIWAY COMPANY
SATISFACTION GUARANTEED
1147 Venice Blvd., Los Angeles 15, Calif.

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Based on modern psychological techniques — This course will take you beyond 13 w.p.m. in

LESS THAN ½ THE TIME

Available also on magnetic tape
See Your Dealer Now!

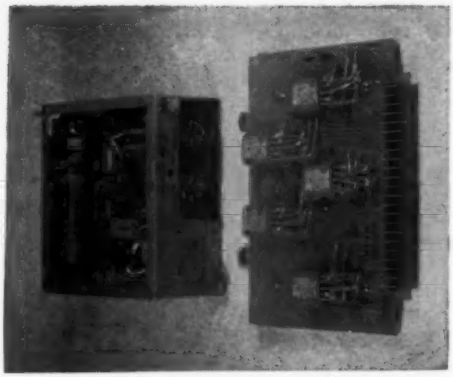
Album Contains Three 12" LP's 2½ Hr. Instruction

EPSILON RECORDS 2769 CAROLINA REDWOOD CITY, CALIF.

The New Look in Surplus

Roy Pafenberg W4WKM
316 Stratford Avenue
Fairfax, Virginia

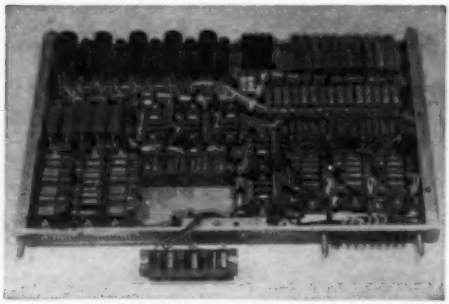
Photo Credit: Morgan S. Gassman, Jr.



The power supply shown at the left of the photo is typical of the more conventional modern subassemblies available from surplus outlets. This unit contains one 5639 and two 5687WA regulator tubes. Rectifier uses two 1N590 and two 1N591 silicon rectifiers. RITCO charges $8.00 for this one. The right view shows a small relay board. The relays are Potter and Brumfield SL11DM latching units which are selling for more than $15.00 each. Three transistors and numerous diodes are also mounted on the printed circuit board. The complete board is selling for $6.00.

"SURPLUS IS DEAD. The only thing left is rusty and mildewed World War II junk which is of no value to anyone." This opinion is heard more and more often these days and nothing could be farther from the truth. Large quantities of military and military quality commercial components are continually entering the surplus market. While no actual figures are available, it is certain that transactions in military and government contract termination, surplus electronic materiel make up a significant portion of the total market volume.

What happens to all of the parts and equipment? Only a very small percentage goes into the amateur surplus market. First of all, listings of surplus materiel are circulated to all government agencies and the military services. Items of use to these activities (this is where your MARS stocks come from) are skimmed off and the balance is eventually put up for bid. Bidders include airline operators, communications companies, exporters, manufacturers, parts distributors, laboratories, R & D organizations, speculators, just plain junk dealers and, finally, your friendly amateur surplus dealer.



Here is a good example of the assemblies selling on the surplus market. This unit, available from RITCO Electronics in limited quantity, is selling for $10.00. The assembly contains thirty 2N332 small signal and ten 2N337 high frequency silicon transistors. At the going rate of $6.20 and $7.80 respectively, net value of the transistors alone is $264.00. Five 10,000 ohm Bourns "TrimPot" potentiometers priced at $8.64 each and five 50,000 units at $9.18 each add $135.00 to the tab. Also included are five 5647 and five 6111 sub-miniature tubes complete with heat sink mounting clips. Over a hundred precision resistors, a good handful of sub-miniature diodes, several glass sealed capacitors and various other parts round out the package.

Usable and/or "Type Certified" aircraft electronics and communications equipment finds a ready domestic or export market and this equipment is used for its original design purpose. Modern test equipment also has a ready domestic or export market and, very often, at a price not far from the original cost. Large inventories of components, particularly those of the Mil Spec type, with a history of source inspection, are picked up by the manufacturers and parts distributors.

Now remember that the above transactions are conducted at price levels well above what we amateurs would consider to be in the surplus "bargain" category. It is the residue and overflow that ends up on the shelves of your surplus emporium, priced for sale to the amateur and experimenter market. These stocks are composed of small lots of modern components which can not be economically marketed to the large users, obsolete or older type components, obsolete or non type-approved aircraft communications and electronics equip-

WOW! WOW! WOW?

MODEL 14 TELETYPEWRITER, includes typing keyboard, printer, cover. Sold "as is," some pull-bars may be broken. Otherwise in fair condition. $32.00

We still have some 11/16 punching tape, 40 rolls per carton. Two cartons make 100 lbs. . . . save on shipping. $5.00

NAVY ARB RECEIVER 195kc—9.05 mc. Covers 40-75-80-160 meters. Xlnt with all tubes. $32.00

BC-453 (Q-5'r) 190-550 kc exlnt 12.75
80 METER ARC-5 (3-4 mc) transmitter, xlnt.....9.50
BC-458 (5.3-7 mc) transmitter, xlnt 8.50
ARC-5 MODULATOR MD-7, brand new 8.50
17 FT. BALLOON, double plastic, wgt 26 lbs, aluminized.4.50
RA-62, AC Supply for SCR-522, xlnt 35.00
28 volt DC supply 4 amps from 115 volt 60 cycle, unused.12.50
MAGNETICALLY REGULATED SUPPLY, brand new. Output 150 DC 3.4 amps plus 300 volts 3.2 amps. Wgt 100 lbs, 2 rack panels 50.00
PHILCO TRANSISTORS, HF OSC/CONV similar to SB-100 .....50¢ ea, 3/$2.00
1,000 KC CRYSTALS, HC-6 holder 2.25
TRANSISTORS, 15 pieces PNP low voltage, OK ....15/$1.25
NATIONAL TRANS. COND. TMK-150, 150-10,5, unused.1.50
220 MC DIPOLE ANTENNA. Brand New w/coax socket..3.00
TECH. MANUALS, fresh as new: any one at $2.50. BC-603, BC-659, BC-683, BC-1,000, ARN-6, ARC-27. Take your choice.
CRYSTALS, HC-6 metal holder. Your choice $1.00 each 37.85, 38.85, 39.85, 40.85, 41.85, 42.85, 45.85, 46.85, 47.85, 48.85, 49.85, 50.85, 51.85, 52.85, 53.85, 23.635, 24.544, 25.635, 26.250 mc.
"LM" POWER TRANSFORMER, original issue, 115 volt 60 cycle in. $1.75
#S-49 TRANSFORMER, 4200 volts CT 300 ma, unused. 115 V 60 Cycle in. $15.00
IBM WIRED MEMORY PLANE, 4096 bit. $12.50
IBM MEMORY DRUM $50.00

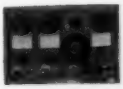
All material FOB Lynn Mass. (you pay shipping).
New catalog #62F, Rush 10¢ handling charge.

JOHN MESHNA JR.
19 ALLERTON ST., LYNN, MASS. phone 617-595-2275

TRC-8 RECEIVER, 230-250 mc, easily modified for 220 or 2 meters. Written up in "CQ" May-June 1960. Built in squelch, speaker, 115 volt 60 cycle power supply. Ours like brand new in desk-type trunk. Schematic included. wgt. 100 lb. $35.00

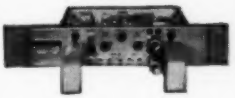
NICKEL CADMIUM BATTERY, the lifetime battery 1.2 volts 4 amp hr. charge & discharge indefinitely. No known life termination. Xlnt, charged, ready for use. $2.00

REMOTE CONTROL, brand new, consists of tel. dial, selsyn indicators, switches, pots, lights, housed in gray aluminum case. Gov't cost $150.00. Experimenters delight. Wgt. 29 lbs. $6.00



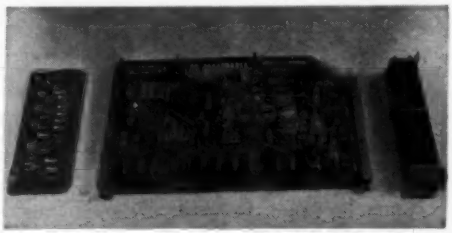
RC-733 RADIO RECEIVER, converts to regular FM receiver, converts to 6 meter and 2 meter receiver. With all tubes, xlnt. $7.00

PHILCO LINE TERMINATION & signalling unit, standard rack mount, contains hybrid coil, relays (4) transformers (115 v 60 c) trans "T" pad, rec "T" pad, 3.5 kc osc sect, tubes, etc. Imp. 600 ohms. Good for fone patch, signalling on line, etc. Gov't cost $421.00 and brand new in gov't package. Shipping wgt. 33 lbs. Late style eqpmt..$12.50



DUAL MICRO-AMMETER (150 microamps), used for conversion to teletype freq. shift and tuning indicator. We include conv. sheet. Xlnt used....$2.00 brand new cond..... 2.75

ment, communications and special purpose electronic equipment which has little commercial or industrial use and replacement or repair part assemblies for the above categories of equipment. Exceptions to the above occur when the quantity of materiel released completely saturates the *world* market so that, regardless of the industrial or commercial applications, the price is pushed down into the amateur bargain category.



More of the units on hand at RITCO. The video amplifier on the left sells for $6.00. This unit uses six 3N34 high frequency transistors that are currently selling for $17.85 each. The center board contains ten of the previously mentioned 2N332 transistors, one 6021, five 6111 and three 5636 subminiature tubes with heat sink mounting clips. Board also contains a wide variety of other components. Assembly on the right consists of sixty of the "TrimPot" potentiometers and sixty precision fixed resistors.

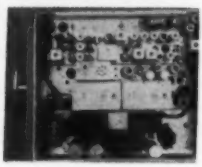
Your dealer in surplus electronic materiel probably has all of the above categories of equipment and components in his stocks and he probably sells to most of the markets listed above. Many amateurs have entered into the surplus business with the idea of dealing solely in surplus materiel suited to the amateur and selling solely to the amateur market. Most of these individuals have since diversified their operation or entered into bankruptcy. It is unfortunate, but true, that the amateur market alone will not support such a venture. For the "good deals" on items in heavy demand, yes; but for every good deal there will be one with a hidden kicker or one that turns into a white elephant.

(Turn Page)

FM MOBILE EQUIPMENT

Motorola FMTRU-41V

150 MC. 6 volt mobile ..$39.50
150 MC. 12 volt mobile .$44.50
150 MC. trans. strip $10.00
30-50 MC. trans. strip ..$10.00



Motorola T44A-6 450MC.

With 18 watt transmitter, .6uv receiver and 6 or 12 volt D.C. supply $48.50
18 watt trans. only $25.00
.6uv receiver only $25.00

Sales to amateurs only

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1100 Tremont Street, Boston 20, Mass.

for TRANSFORMERS see

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IMPROVED VHF—UHF RESULTS
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Specials
300 to 52 ohm waterproof baluns—83 connectors 50-54 megacycles $10.75; 144-148 megacycles $8.60
RG8U Name Brand Polyfoam Insulated cable .....ft. .13
FOR THE DX BOYS
G4ZU Minibeams 10-15-20 A low, low $74.95
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6 METER BARGAIN

6 meter, 150 mw., 4 channel, transistorized transmitter with AM modulator. Complete with transistors and 50.5 mc. crystal. Requires only 12 volts at approx. 35 ma. Ideal for walkie-talkie or get 10 to 15 mile range with a beam. Only a few available at the low price of $14.95 ppd.

VANGUARD ELECTRONIC LABS Dept. H-3
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Learn to increase speed with an Instructograph—the Code teacher that takes the place of an operator-instructor and enables anyone to master code without further assistance. Available tapes from beginners alphabet to typical messages on all subjects. Speed range 5 to 40 WPM. Always ready—no QRM. Thousands have "acquired the code" with the Instructograph System. Write today for convenient rental or purchase plans.

INSTRUCTOGRAPH COMPANY
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MATCHING CABINET
for KWM-2 or 30L-1.
Great for accessories or small linear.
Complete with panel **$34.00**
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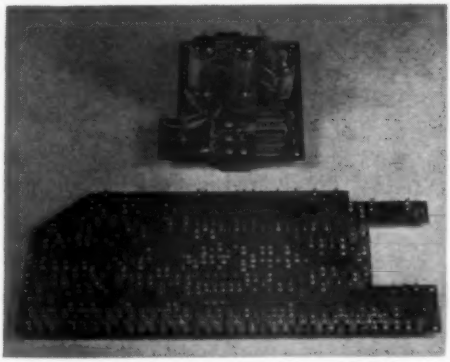
931 N. Euclid Ave., Anaheim, Calif.

The above background information should give you a fair understanding of the facts of life as related to the surplus business. Now, how can you as the bargain hunting amateur turn this knowledge to your advantage? The answer lies in advertising, and conversely, the lack of it. For those items that are widely available in large quantities and which have known application or utility, check your surplus dealer advertisements and compare prices. Then after you have compared price, including any difference in shipping costs, buy from the best source. However, remember that there is an element of risk in any sight-unseen transaction. The major problem area will probably be in the difference between the advertiser's estimate of equipment condition as compared to yours. Of course, the answer to this is inspection before purchase. While this requires a trip to the dealer it can pay off in other ways.



The small regulator-rectifier sub-assembly shown at the top of the photo is selling at around $5.00. The unit contains six IN1413 high voltage silicon diodes that are currently selling for $20.90 each. The special terminal board shown at the bottom of the photo is typical of the units available on the surplus market. A few minutes with a hacksaw and file will turn out a number of smaller boards to meet your construction requirements.

This brings us to the heart of the matter. If you are interested in acquiring real surplus bargains, visit the dealers regularly. Every dealer has many items of prime components and equipment in quantities too small to advertise individually. Quite often, these bargains will consist of equipments, assemblies, or subassemblies containing the most modern components. Examine these assemblies carefully. With modern packaging techniques, a fantastic quantity of miniature components may be fitted into a small assembly. The acknowledged superiority of these Mil Spec miniature components make them ideal for amateur construction projects.

SURPLUS FROM SPACE

RCA ALL BAND RECEIVERS

AR-88, 540 kc to 32 mc

Excellent **$170.00**

Read-N-Save

DB Meters 3½" rd —10 to +6db 1mw @ 600 ohms..$2.75
Sperti Vacuum Switches for ART-13, etc. ------NEW $1.00
Velvet Verniers w/large knob ----------NEW $1.00
600 Ohm 300 Watt Non-inductive Resistors ---------- $2.50
WE-255A Polar Relays for TTP ---------- $4.50
Sockets for use with above relay ----------NEW $2.50
Ohmite Z 26 rf Chokes ----------3/1.00
Ohmite Z 144 rf Chokes ----------4/1.00
Leach Relay #1351 110 vac spst----------2.00
PL-259 or SO-239 coax conn----------3/1.00

NEW SURPLUS TUBES GUARANTEED

2C39A ___	$7.50	8005 ____	$14.00	250TH ___	$18.50
3CX100A5	$10.00	4-250A __	$21.00	4X250F __	$25.00
6161 ____	$35.00	5881 ____	$1.50	807 ____	$1.00
829B ____	$8.50			6AN5 ____	$1.25

We buy & sell large quantities of Military and Commercial Test Equipment. AN/GRC, PRC, TRC and test equipment TS and AN/UPM or URM. What have you for sale or trade?

RG-11-U Coax Cable (72 ohm)
100 ft roll w/PL-259 ea end ----------$7.50

Berkeley Model 5500C Universal 100 kc counter & timer Lab tested—perfect...$425.00

Low Freq. Marine Receivers—RCA
3 bands 240 to 2000 kc—115 vac
New condition ----------$69.50

BC-463A Transmitter and AM Modulators converts to 6 mtrs. uses 815 final 2 ea 6L6 Modulators—New w/tubes --------$19.50

Coax Relays SP3T 28vdc
General Communications 3N120RC or Thompson Products 10566. New --------$17.95

4X150A Tubes removed FM equip. tested OK
Sorry, no more sockets ------$5.50 ea, 2/$10.00

T-179/ART-26 Transmitters 300-600mc, 35w
Brand new w/tubes, for ham TV--------$59.50

WE-416B Tubes
Tested and Guaranteed ----------$12.95

—MONEY BACK GUARANTEE ON ANYTHING WE SELL—

ALL SHIPMENTS F.O.B. BRONX, N. Y.

SPACE ELECTRONICS CO.

218 West Tremont Ave., Bronx 53, N. Y.

TRemont 8-5222

A visit to RITCO Electronics in Annandale, Virginia proved the case in point. A large variety of surplus sub-assemblies were in stock. Some of these, using the most modern components, are shown in the photographs. Incidently, RITCO was chosen as an example only because of convenience and geographical proximity; all dealers often have items in the same category.

Although the assemblies shown in the photographs are priced within the reach of most amateurs, the value of the components is, from the taxpayer's point of view, rather frightening. To prove the point, a description and component breakdown of each assembly is given in the photo caption. The assemblies presented here are simply examples and the prices shown are for comparison only. Don't go to RITCO, by the time this article appears, and expect to find all these items. They are being sold over the counter, without advertising, only because the quantities of any single item are too small to justify advertising.

The case has been presented. If you have a desire to construct your equipment using the latest techniques and the most modern components, all on a lunch money budget, then visit your surplus dealer. . . . W4WKM

CHOKE, 6 Hy. 350 Ma. 5 KV----------$1.95
TRANSFORMER, 115V 60 cyc, 2 secondaries each 350 V @ 4 amps.----------$22.50
TRANSFORMER, 115V 60 cyc, sec. 1460VCT 290 MA, plus bias winding 736 V 33 MA ----------$10.00
CHOKE, 5.5 Hy. 900 MA, 26 ohms, 1.5 KVA test.$8.95
SWINGING CHOKE, 2.3/5.5 Hy. 850/100 MA, 6 KVA test ----------$12.50
POWER TRANSFORMER, pri. 120 or 240 V 60 cyc, sec. 160 V, 600 V, & 1500 VCT @ 200 MA. 6.3 @ 10 A. 6.3 @ 10 A. 5 V @ 5 A. 5 V @ 5 A.----------$8.15
CHOKE, 1.72 Hy. 400 MA, 10 KV.----------$3.75
850 WATT MODULATION TRANSFORMER, Chicago Xfmr Co., FS-type frame. Pri. 10,000, Sec. 3750 and 7550 ohms ----------$32.00
CHOKE, 2 Hy. 1.15 Amp. 5 KV test.----------$12.50
CHOKE, 6 Hy. .5 Amp. 3.5 KV.----------$4.50
CHICAGO FILAMENT XFMR, 115V 60 cyc, sec. 5V @ 15A, 5KV AC hipot ----------$7.50
MULTI-TAP FILAMENT xfmr, pri. 210-240V 60 cyc in 5V steps, sec. 5/7.5/10/11V @ 35A, common CT ----------$19.95
FILAMENT XFMR, 115V or 220V 50/60 cyc, sec. 5V @ 20A CT, 35kv ins.----------$12.00
FILAMENT XFMR, 117V 50/60 cyc, two 10V 13A @ 12.5KV, one 10V 13A @ 7.9KV, one 6.3V 1A..$11.00
CAPACITOR 8MF 2KV, Cornell-Dubilier, with brackets ----------$3.15
CAPACITOR 4MF 3KV, Goodman, with brackets.$3.75

VERN'S 7701 S. Normandie Los Angeles 44, Calif.
All Orders FOB L. A. — Phone (213) PL 1-0278

FM FM FM FM FM

FMTRU 30D 150mc $45.00 FMTRU 41V 30-50mc $85
FMTR 20D 30-50mc $45.00 50BR base sta. 20-50mc $8
FMTRU 80D 150mc $65-$100 80Y base sta. 30-50mc $150
FMTR 80D 30-50mc $65-$100 T44A6A 450mc $100 and up
Also-GE gear $35 and up. Dumont and Link gear available.

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HUNDREDS OF TOP QUALITY ITEMS—Receivers, Transmitters, Microphones, Inverters, Power Supplies, Meters, Phones, Antennas, Indicators, Filters, Transformers, Amplifiers, Headsets, Converters, Control Boxes, Dynamotors, Test Equipment, Motors, Blowers, Cable, Keyers, Chokes, Handsets, Switches, etc., etc. Send for Free Catalog—Dept. 73.

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USED EQUIPMENT—
GUARANTEED A-1 CONDITION

4—VIKING "500" Transmitters (new price $1050) only $495. VIKING VALIANT $269; KWS-1 $895; GLOBE 500-C ($895 new) $425; B & W 5100 $199; DX-100 $149; NC60 w/5 coils $329; NC183-D $199; B & W L-1000-A $229; NC-300 $229; COLLINS 32V3 $299; KP-81 PIERSON $225; VIKING II & VFO $149. Many others in stock. Write & ask.

Complete line of Antennas & Ham Parts.

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813	$8.95	4X150A	$8.95	304TH	$27.50	931A	$2.95
75TL	12.95	902	3.95	2API	2.95	3API	1.95
6L6	1.10	807	.95	807W	1.69	719A	6.95
832A	3.95	8025	.95	3B24	.75	3C45	2.95
715B	2.95	2K25	4.95	1P25	4.95	808	.50

2C26-446-717-954-955-957-958-1625—Any 12 for $2.00
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Factory Tested Gtd.!

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rms/plv	rms/plv	rms/plv	rms/plv
35/50	70/100	140/200	210/300
.07	.14	.19	.29
rms/plv	rms/plv	rms/plv	rms/plv
280/400	350/500	420/600	490/700
.34	.44	.53	.69
rms/plv	rms/plv	rms/plv	rms/plv
560/800	630/900	700/1000	770/1100
.83	.98	1.08	1.50

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Rated 400 pvl/280rms @305Ma @100°C
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Diode order $10 shipped Post free

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SILICON POWER DIODE STUDS*

Operation Up to 125°C Case Temp.

D.C. Amps	50Plv 35Rms	100Plv 70Rms	150Plv 105Rms
2	.25	.34	.42
3	.60	.85	1.10
6	.70	.95	1.15
12	.85	1.15	1.35
35	1.80	2.20	2.95
70	3.75	4.50	5.00
240	4.50	5.40	7.70
D.C. Amps	200Plv 140Rms	300Plv 210Rms	400Plv 280Rms
2	.49	.60	.84
3	1.25	1.50	1.80
6	1.40	1.65	1.95
12	1.68	1.85	2.07
35	3.25	4.90	6.10
70	5.80	8.80	Query
240	9.00	Query	Query

*Derate 20% for Battery or Capacitive Load or D.C. Blocking!
*Stud mounted on Heat-sink

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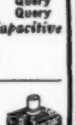

TYPE	VRMS/PIV	AMPS	PRICE
T866	5000/10400	0.3	$16
T5R4	1900/2800	0.5	$7

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Full Length Leads Factory Tested & Guaranteed! U.S.A. Mfg.

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2N441, 2N277 $1.25, 4 for $4; 2N442, 2N278 $3@, 2 for $5; 2N443, 2N174 $4@, 2 for $7; 2N677 $1@, 12 for $10;
2N677A $2@, 6 for $10; 2N677B $3@, 4 for $10; 2N677C $5@; PNP 2N128, 2N187, CK722 4 for $1, 25 for $5; NPN 2N292, 2N293, PNP 2N223 ¢30@, 15 for $4. 100 for $22; PNP 2N670/300MW ¢40@, 20 for $7; PNP 2N671/1W ¢60@, 10 for $5; 2N597, 2N598, 2N599 PNP $1.50@, 4 for $5.
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Factory Tested
***MFGRD in U.S.A.
Univ. Replcment
2N155, 2N156, 2N284, 2N256, 2N307, 2N554
SPECIAL TO3GP.....55¢, 10 for $5
40 for $18
$10 or more this item we pay P.P./U.S.A.

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0A3	.85	6K7	.79	6S4	5.00
0B2	.85	6L6	.99	6S7	.99
0C3	.85	6SN7	.72	6S8	.79
0D3	2/$1	6T8	.89	5Y3G	.75
0Z4	.79	6V6GT	.79	5Z3Z	.65
1B3	.99	6X5	.69	5Z4	1.00
1C4	2/$1	12AT6	.65	5Z4G	.69
1R4	2/$1	12AT7	.85	5879	2/$1
154	.80	12AU6	.63	5894	13.50

We Swap Tubes! What Do/U Have?

1T4	.60	12AU7	.69	5AP3	3.00
1T5	.55	12AX7	.75	5BP1A	5.00
1U4	2/$1	12AT7	.89	5BP1	6.00
1U5	.65	12BA7	.90	5SP1	3.00
1X2	.99	12BE6	2/$1	5CP1	3.00
2C39A	10.00	12BH6	3/$1	5CP4A	6.00
2C40	5.00	12J5	.69	5NP1	6.00
2C43	3.50	12J7	.69	5NP4	6.00
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2E25	2.50	12SJ7	.60	5AP1	5.00
2E26	1.80	12SK7	.75	5ADP1	35.00
2K25	6.50	12SL7	.59	5ADP7	25.00
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3X2	2/$1	12SR7	.59	5BP2	6.00
3C24	3.00	24G	3.00	5BCP7	25.00
3D22	2.40	25A6	1.25	5BGP2	35.00
3E29	5.90	25L6	2/$1	5BHP2	25.00

Wanted 304TL Tubes

3Q5	.85	25T	5.00	5CP1A	7.00
4-65A	9.50	25Z3	.71	5CP2	4.00
4-125A	21.00	25Z6	.75	5CP7A	4.00
4-250A	33.00	35Z3	.85	5CP11A	5.00
4X150A	14.00	83/V	2.50	5EP1A	18.00
4X250	34.00	90L6	2/$1	5FP4A	18.00
4X500	57.00	75	.81	5FP5	3.00
5R4	1.00	83V	2/$1	5HP7A	3.00
5T4	2/$1	2000T	120.00	5HP14	3.00
5U4	.75	4X150G	12.00	5FP14A	6.00

125°C SILICON PNP TRANSISTORS
250 to 400 MW
FULL LENGTH LEADS
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5Z4	.89	250TL	18.00	5JP2	1.00
6A7	.99	307A	3/$1	5JP14	25.00
6A8	.99	VR92	5/$1	5LP1	18.00
6AB4	2/$1	388A	2/$1	5LP1A	25.00
6AC7	.59	350A	1.00	5LP4	6.00
6AG5	.59	350B	1.00	5LP4A	6.00
6AG7	2/$1	6146	2.45	5RP1	25.00
6AK5	.69	450TH	25.00	5SP7	15.00

Wanted Test Sets and Equipment

6AL5	.59	450TL	24.00	5SP7A	21.00
6AQ5	.65	460	11.50	5QP4	8.00
6AR6	.75	707B	1.25	5UP1	6.00
6AS7	2.85	715C	10.00	5XP21	36.00
6AT6	.65	721AB	2.50	5YP1	25.00
6AU6	.79	725A	1.50	7BP1	5.00
6B8	.80	805	3.35	7BP4	5.00
6BE6	.59	807	1.10	7BP4A	5.00
6BK4	1.49	811	2.90	7BP7	5.00
6BH6	.79	811A	4.75	7BP7A	5.00

Top $$$ Paid for 304TL, 813, 811A, 812A Tubes

6BK7	.99	812	3.95	7EP4	5.00
6BL7	1.30	813	12.00	7GP4	7.00
6BT7	1.11	815	1.75	9AUP7	5.00
6BY5	1.19	829B	7.50	9JP1	5.00
6BZ6	.73	832A	5.00	9LP7	1.00
6C4	.45	833A	34.00	10BP4	6.00
6C5	2/$1	837	1.50	10KP7	11.00
6C8	2/$1	866A	1.50	12GP7	7.00
6CB6	.70	934	10/$1	12QP4	9.00
6CD6	1.49	957	10/$1	12RP4A	9.00

Top $$$ Paid for 304TL Tubes!

6E5	.79	991	5/$1	12SP7	11.00
6F4	1.85	1619	5/$1	14EP4	10.00
6F5	2/$1	1620	1.00	16GP6	12.00
6F6	2/$1	1625	3/$1	16DP4A	12.00
6F8	.74	1626	12/$1	17AVP4	14.00
6J6	4/$1	1629	4/$1	17AP8	14.00
6J4	1.75	2050	1.20	17GP4	14.00
6J5	2/$1	5517	2/$1	17KP4	14.00
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	10	6.10	12.15	26.30	41.60
	12	7.75	14.90	30.95	43.45
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Send 25¢ for New Catalog

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2 to 6 Amp.....6 for $1
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83 YX 627 EE. P-2 Kit, only..... **$14.95**

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ONLY **$119.95**

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Bilateral! Space-age word, key to one of the biggest SSB transceiver values ever! Exclusive SSB Bilateral amplifiers and mixers (pats. appd. for) operate in two directions—avoid needlessly-idle stages in either transmit or receive. This eliminates a boxful of components —simplifies wiring—reduces equipment size—provides savings in cost that reflect in a lower selling price. **There is no compromise!** The compact SB-33 package includes **everything** essential for the brightest state-of-the-art SSB performance—features a **Collins mechanical filter that is used in both transmit and receive!** And add—as further cost-reducing innovations, new SBE overtone techniques for a unit using only three quartz crystals! Advanced solid-state techniques are skillfully applied throughout SB-33 to take full advantage of lower power consumption and superior heat rise properties of transistors and diodes. Equipment is more effective—smaller in size. Stability is inherent, VFO drift extremely low. Both VFO and I-F are gang-tuned on the nose. No critical bandpass circuits.

4-Bands: 80-40-20-15 meters.

Power input: 135 watts P.E.P. maximum (speech waveform).

Receiver sensitivity: Better than 1 uV for 10 db signal/noise ratio.

Sideband selection: Upper or lower sideband selectable by panel switch without change in frequency.

Tube and semiconductor complement:
2—PL-500 beam power tetrodes.
1—12DQ7 driver. 19 transistors.
13 diodes, 1 zener diode.

Power supply: Built in 115VAC supply.

Loudspeaker: Built-in.

Size: 5½"H, 11¾"W, 10¼"D. 15 lbs.

389.50

SB-33 Special inverter, 12V DC/115V AC 39.50
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SB-33 accessory adaptor for rear of transceiver $1.95

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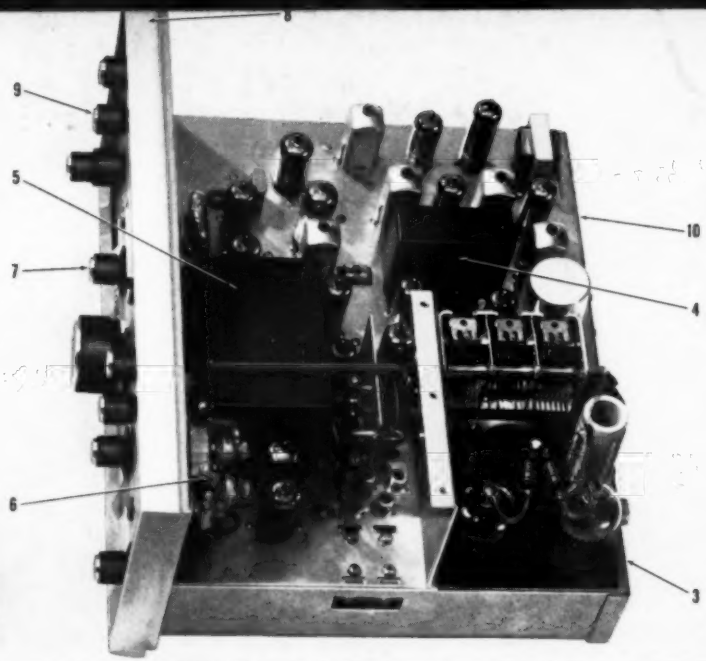
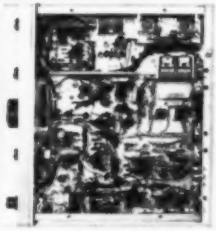


NATIONAL ONE YEAR GUARANTEE

12 inside reasons why your next rig should be the NCX-3 SSB transceiver

1. *Complete* coverage of the 80, 40 and 20 meter phone and CW bands.
2. *All* desirable operating features including built-in VOX/PTT, SSB/CW AGC, AM detection in the AM mode, and break-in CW with adjustable release time.
3. Variable pi-network final amplifier uses parallel 6GJ5 pentodes for *conservative* 200 watts PEP on SSB, 200 watts DC input on CW and 100 watts input on AM. Note: Protective shield removed for photo.
4. High frequency 2.5 kc crystal lattice filter for both transmit and receive, together with RCA 7360 balanced modulator provides 50 db carrier suppression and 40 db unwanted sideband suppression.

The NCX-3 shown with matching NCXA AC Supply/Speaker Console ($110), is a complete — and compact — 80, 40 and 20 meter amateur station. NCXD Transistorized DC Supply ($119.95) for use in mobile operation. Mobile mounting bracket is included with NCX-3.



The NCX-3 is wired to conform with National's stringent quality standards. Note cable harnessing and neat "right-angle" component placement to make all parts readily accessible.

5. National "high-zero" VFO for maximum mechanical and electrical stability provide simultaneous transmit and receive frequency adjustment.
6. Combination illuminated D'Arsonval meter automatically switches between signal strength and PA cathode current.
7. Function switch automatically sets NCX-3 up for operation in any mode.
8. Extruded aluminum front panel for maximum solidity, *anodized* instead of painted for resistance to wear and scratches.
9. Front panel carrier balance control for AM or CW operation.
10. External relay control for use with high power linear amplifier.
11. The NCX-3 is backed by National's exclusive One Year Guarantee . . . your assurance of superb engineering and trouble-free operation.
12. Amateur Net $369 — need we say more?

Write for brand new specification sheet!

National
Radio Company, Inc.

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